

CHALLENGE
TO LEAD

SREB



High School Reform Works — When Implemented:

A Comparative Study of High- and Low- implementation Schools

by Gene Bottoms, Alice Presson and
Lingling Han

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Regional
Education
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Foreword

The Southern Regional Education Board has adopted 12 *Challenge to Lead* education goals to help SREB states lead the nation in educational progress. One of these 12 goals is to have all high school graduates ready for further learning and a career.

SREB *Challenge to Lead* Goal:

All recent high school graduates have solid academic preparation and are ready for postsecondary education and a career.

State accountability standards and assessment require that schools and districts ensure that all students perform at high levels of academic achievement. To receive a high school diploma today, students must pass end-of-course high school graduation exams and complete a demanding academic core.

To achieve these goals and sustain progress, schools will need to require students to complete a solid academic core, teach in ways that engage students in learning challenging content, and provide support and extra help for all students who have difficulty in mastering that content. Approximately 1,000 high schools in more than 30 states are using the *High Schools That Work (HSTW)* school improvement design to aid them in reaching these goals. *HSTW* provides schools a framework of research-based key practices and conditions that, when implemented, can assist in raising the academic and technical achievement of high school students.

Students, regardless of ethnicity and levels of their parents' education, performed better at schools that more thoroughly implemented the *HSTW* design (high-implementation schools) than did students from similar high schools that did less in implementing the design (low-implementation schools). In fact, African-American students and students whose mothers had not undertaken any postsecondary study fared much better in high-implementation high schools than did students with similar backgrounds at low-implementation high schools.

You will know that your school has fully implemented the *HSTW* improvement design when the main drivers for improving student achievement are in place. These main drivers are

- getting students to take a **rigorous** academic core and **high-quality career/technical courses** in a high-demand field.
- teaching in ways that students see a **reason for learning the content** and that **engages them in challenging assignments** that get beyond memorization of facts and procedural knowledge.
- having a faculty with a **shared and strong commitment** to provide students the **extra help** needed to meet course standards.
- providing a **mentor** to assist each student and his or her family in **exploring and setting post-high school goals**, developing a **challenging program of study aligned to those goals**, and **reviewing progress** at least annually.
- reaching **consensus** with faculty members on what it means to teach **to high standards, to teach well**, to help low-performing students become **independent learners**, and to create a climate of **continuous improvement** and support for faculty and students.
- developing **successful transition programs for middle grades to high school** that result in more students being successful in more rigorous academic courses.
- **using the senior year** to get more students ready for postsecondary studies and work.

Principals can use this report as a tool to lead staff to more fully implement the research-based practices described.

Principals can organize faculty study groups to address the following questions:

- What can we do to get increasing percentages of students to complete a solid academic core and an in-depth study in a career or academic area?
- What would higher quality career/technical studies look like at the school?
- How can we create a school culture that gets all students to make the most of high school?
- How can all teachers strengthen students' literacy and numeracy skills in their content areas?
- How can we provide the extra help in language arts/reading, mathematics and science that enables students to meet or exceed state and national standards?
- How can we get more students and parents to participate in a guidance system that involves students planning high school studies that lead to postsecondary learning without having to take remedial courses?
- What can we do to strengthen the climate of continuous improvement?

Thoroughly implementing a school improvement design is hard work. There is no quick fix. With a sustained and joint commitment on the part of district and school leaders, schools *can* make continuous improvement in student achievement.

Mark Musick
President
Southern Regional Education Board

Introduction

In 1987, the Southern Regional Education Board (SREB) and 13 southern states formed the SREB-State Vocational Education Consortium and established two goals. One goal is to increase the percentages of career-oriented¹ students who complete a planned sequence of career/technical (CT) courses and a challenging academic core in English/language arts, mathematics and science needed for postsecondary education and careers. The second is to increase the percentages of career-oriented students who demonstrate performance in reading, mathematics and science at proficiency levels necessary to pass employers' exams and to pursue postsecondary studies without having to take remedial courses. All 1,000 high schools in the *High Schools That Work (HSTW)* network are expected to comply with these goals. To achieve these goals the consortium developed a framework of key practices that represent the *HSTW* improvement design, and over the years SREB has developed a set of research-based indicators for measuring the depth to which the design has been implemented.

The <i>HSTW</i> Key Practices	
<ul style="list-style-type: none"> ■ High expectations ■ Quality career/technical studies ■ Challenging academic studies ■ Completing a challenging program of study ■ Quality work-based learning 	<ul style="list-style-type: none"> ■ Teachers working together ■ Students actively engaged ■ Quality guidance ■ Extra help ■ Keeping score on continuous improvement

¹ Career-oriented students are the 60 to 65 percent of high school students who plan to work, enroll in a two-year technical or community college, attend a four-year college or university with an open admission policy, or enter the military after high school graduation.

The *HSTW* design requires high schools to make a serious and long-term commitment to a school-improvement framework that focuses continuously on improving student achievement for all groups of students, especially career-oriented students. It means that high schools eliminate the general academic track and teach all students those core academic courses that were historically taught only to the best students. To determine the extent to which implementing the design is associated with student achievement this report addresses three questions:

- Do career-oriented students, regardless of their ethnic and parental educational backgrounds,² have significantly higher achievement at high schools that have more deeply implemented the *HSTW* design than do similar students at schools that have made less progress?
- Why do career-oriented students at high-implementation schools perform better than career-oriented students at low-implementation schools?
- What can school districts and states do to support schools in more fully implementing the *HSTW* design?

These are important questions since no school improvement design can be judged as succeeding or failing until there is evidence that it has been implemented. High school leaders have access to many good and valid ways to improve schools and student achievement. However, schools must stay with an improvement design long enough to implement it in ways that change school and classroom practices and, eventually, student achievement.

To answer these questions the SREB-State Vocational Education Consortium used the results of the 2002 *HSTW* Assessment, student surveys and high school teacher surveys to identify two groups of schools. The high-implementation schools are the 50 high schools that have

² In the absence of information on the income levels of the parents of the students at the two groups of schools, *HSTW* uses the educational level attained by each student's mother as a proxy. Students whose mothers have a high school education or less are described as from a low-educational background. Students whose mothers have some education beyond high school are described as being from a high-educational background. This information was collected through the student survey accompanying the *HSTW* Assessment.

demonstrated the most progress in implementing the design and the low-implementation schools are the 50 high schools that are similar in demographics, type of community — rural, urban, suburban — that have demonstrated less progress in implementing the design.

To assess students' readiness for work and further study, in 1987, the SREB-State Vocational Educational Consortium³ began working with the Educational Testing Service (ETS) to develop a National Assessment of Educational Progress (NAEP)-referenced exam. This exam would be a tool for assessing continuous school improvement and assessing whether more students were meeting the desired performance goals. In mathematics and science, the performance goals were set at the basic level of the 12th-grade NAEP-referenced exams. The goal for reading (279) is one that is approaching the proficient level on the NAEP-referenced exam. The SREB-State Vocational Education Consortium's definitions of what it means to perform at a proficiency level necessary for further study and employment are found on pages 102-107.

To identify the high-implementation schools, SREB selected all schools that had at least 55 students who participated in the 2002 assessment and ranked those schools by the percentages of students who had intensive experiences in each of 11 indexes.⁴ Schools were assigned a score of 0 to 5 for each index according to their percentage rankings in the intensive category. For instance, schools received a score of "5" if they ranked in the top 10 in an index. They received a "4" if they ranked between 11 and 20, and so on. Each school was assigned a combined index score, with 55 being the maximum and 0 the minimum. The 50 schools with the highest total score were selected as the high-implementation schools.

³ Today 31 states belong to the SREB-State Vocational Education Consortium. This means they are committed to helping schools use the *HSTW* improvement design as a way to improve high schools for all students, but with a special focus on career-oriented students.

⁴ An index is a group of related experiences in an area that students or their teachers should experience. SREB determined the percentages of students who had various combinations of the experiences in an index area to help determine if a school's emphasis on the index's topic is intense, moderate or low. Ten index areas are based on student survey data; they are high expectations, literacy, numeracy, science, completing the recommended curriculum, quality career/technical studies, integrating academic content and skills into career/technical courses, creating a positive culture of learning for all students, providing quality work-site learning, and providing timely guidance. The 11th index is based on responses to the teacher survey and describes the intensity of the school's emphasis on creating a climate of continuous improvement.

SREB identified the low-implementation schools by pairing each high-implementation school with a site that was not among the top 50 schools on any index list. The schools were matched according to the percentages of minority students; the percentages of students with mothers having some college; school size; type of school (career center, comprehensive high school, full-day career/technical high school); and type of community (rural, urban or suburban).

As a result of the pairing, 42 high schools in each group are comprehensive high schools; five are full-day technical high schools; and three are shared-time career centers. Twenty-three high schools in each group are in rural areas; 19 are in small cities or suburban areas; and eight are in large urban areas. High-implementation schools had enrollments of 20 percent African-American and 66 percent white students, compared to 21 percent African-American and 65 percent white students at low-implementation schools. (See Table 1.) At the high-implementation schools, the percentages of African-American students ranged from one to 95 percent, compared to from one to 98 percent at the low-implementation schools. Similarly, 34 percent of the students at high-implementation schools were minorities, compared to 35 percent at low-implementation schools.

Table 1
Distribution of Students by Ethnicity and Parents Having Completed Some College at High- and Low-implementation Schools

	High-implementation Schools (3,131 students)	Low-implementation Schools (2,625 students)
African-American	20%	21%
White	66	65
Other minorities	14	14
Parents completed some college	70	68

Source: 2002 *HSTW* Assessment results for career-oriented students

Because there are no significant differences between the two groups of schools in percentages of ethnic groups represented, levels of parental education, school sizes, and school and community types, the differences in the achievement scores between the two groups cannot be attributed to those factors.

Summary of Findings

Do career-oriented students have significantly higher achievement at high schools that have more deeply implemented the *HSTW* design than do similar students at schools that have made less progress?

- Students at the schools that have more fully implemented the *HSTW* design have significantly higher achievement in reading, mathematics and science than do the students at schools that have not, regardless of ethnicity or parental educational backgrounds.
- African-American students at high-implementation schools, when compared to African-American students at low-implementation schools, were 20 percent more likely to meet the *HSTW* reading goal and 23 percent more likely to meet the *HSTW* mathematics goal. White students at high-implementation schools, when compared to white students at low-implementation schools, were 15 percent more likely to meet the *HSTW* reading goal and 13 percent more likely to meet the *HSTW* mathematics goal.
- Both African-American and white students at high-implementation schools, when compared to African-American and white students at low-implementation schools, were 12 percent more likely to meet the *HSTW* goal in science.

- The achievement gaps between African-American and white students at high-implementation schools are smaller than those at low-implementation schools.
- Smaller percentages of African-American students at high-implementation schools scored below the basic level in reading and mathematics than white students at low-implementation schools. Smaller percentages of students from low-educational backgrounds at high-implementation schools scored below the basic level in reading than students from high-educational backgrounds at low-implementation schools.

Why do career-oriented students at high-implementation schools perform better than career-oriented students at low-implementation schools?

- In high-implementation schools students from high-educational backgrounds are twice as likely to complete all parts of the recommended academic curriculum than are students from low-educational backgrounds. Students from low-educational backgrounds at high-implementation schools are two and one half times more likely to complete all parts of the recommended academic core than are students at low-implementation sites.
- High-implementation schools, compared to low-implementation schools, had significantly more students with the following experiences in high school, regardless of race and parental educational background:
 - **Completed a rigorous academic core and a career focus that included —**

- all three parts of the *HSTW*-recommended academic core — four years of college-preparatory English; four years of mathematics, including Algebra I and higher; and three years of science, with at least two in laboratory courses at the college-preparatory level.
- experiencing higher quality career/technical classes with more emphasis on using academic knowledge and skills to complete real-world assignments, demonstrating independent learning skills and being held accountable for meeting course standards.
- experiencing work-site learning with seasoned mentors who gave them job-specific instructions on how to do the work.
- **Had more expected of them. This included —**
 - experiencing higher classroom expectations and receiving encouragement from their teachers to do their best.
 - experiencing a school culture that motivates them to do their best in more demanding courses by attending and actively participating in their classes.
 - working hard to meet high standards, doing one or more hours of homework daily and revising their written work.
- **Had teachers who provided good learning experiences. These included —**
 - experiencing an intensive emphasis on reading and writing for learning across the curriculum that requires thinking about what they read, interpreting what they read and drawing conclusions.

- experiencing an intensive emphasis on numeracy, taking four years of challenging mathematics courses, having more engaging experiences that included solving real-world problems, completing challenging mathematics assignments, working in groups to complete assignments, using graphing calculators and explaining solutions orally.
- taking four years of more demanding science courses, being engaged in hands-on learning experiences in laboratories, having more opportunities to see the connections between what they are learning and real-life scientific problems, having in-class opportunities to learn from other students, and making greater use of literacy skills to deepen their understanding of science content.
- **Received critical support and had a close relationship with an adult at the school. This included —**
 - getting extra help frequently from their teachers and other students and to meet course standards.
 - having guidance and advisement assistance to help them and their parents explore and set postsecondary goals by planning a solid academic core and a goal-aligned sequence of career/technical courses.
- High-implementation schools had more teachers who perceived their principals functioning as instructional leaders and supporting continuous improvement than did teachers at low-implementation schools.

Do career-oriented students have significantly higher achievement at high schools that have more deeply implemented the *HSTW* design than do similar students at schools that have made less progress?

Career-oriented students — white and African-American — at the high-implementation schools had significantly higher achievement on NAEP-referenced exams in reading, mathematics and science than similar students at low-implementation schools.⁵ Two-thirds of the students in the higher group met the *HSTW* Performance Goals in mathematics and reading, compared to about half of the students in the lower group of schools. (See Table 2.) Fifty-seven percent of the students in the higher group met the science goal, compared to 42 percent in the lower group. High-implementation schools had 20 percent more white than African-American students meeting the *HSTW* reading performance goal, compared to 25 percent more at low-implementation schools. At high-implementation schools 23 percent more white than African-American students met the mathematics performance goal as compared to 33 percent more at low-implementation schools.

High-implementation schools were much closer to reaching the *HSTW* goal of 85 percent of students meeting each performance goal. Five of the high-implementation schools had 85 percent of their students meeting at least two of the *HSTW* performance goals, while none of the low-implementation schools had students meeting the goals.

⁵ Assessment data presented in this report are based on the results of the 2002 *High Schools Work* Assessment of 12th-graders who completed a sequence of courses in career/technical studies. Referenced to NAEP, the assessment consists of achievement tests in reading, mathematics and science. The assessment includes surveys of students' school and classroom experiences that demonstrate what and how they have been taught, what has been expected of them, and how much effort they and the school have exerted. The assessment also includes transcript information that relates students' courses to achievement in reading, mathematics and science. The intent of the *HSTW* Assessment is to provide information that helps school leaders and teachers connect student performance with the courses that students take and the quality of classroom experiences.

Table 2
Percentages of Students Meeting the *HSTW* Performance Goals on the 2002 *HSTW* Assessment

	High-implementation Schools	Low-implementation Schools	Percentage-point Difference	All Network Schools	<i>HSTW</i> Goal
Reading					
All Students	66%	48%	+18%	53%	85%
African-American Students	51	31	+20	38	
White Students	71	56	+15	58	
Mathematics					
All Students	68	51	+17	55	85
African-American Students	51	28	+23	36	
White Students	74	61	+13	61	
Science					
All Students	57	42	+15	45	85
African-American Students	32	20	+12	24	
White Students	65	53	+12	53	

Source: 2002 *HSTW* Assessment results for career-oriented students
All differences are significant to at least the .01 level.

More students, regardless of ethnic or parental educational backgrounds, in high schools that have more fully implemented the *HSTW* design were more likely to perform at the basic, proficient and advanced levels in reading, mathematics and science on NAEP-referenced exams than were similar students from low-implementation schools. (See Tables 3, 4 and 5.)

Using the NAEP-referenced proficiency levels, 23 percent fewer African-American students were performing below basic in reading at high-implementation schools than at low-implementation schools. For white students the percentage was 13 percent fewer and 15 percent for students from high- and low-educational backgrounds. (See Table 3.)

In mathematics, 23 percent fewer African-American students were performing below basic at high-implementation schools than at low-implementation schools. The differences between the two groups of schools were 13 percent for white students, 16 percent for students from high-educational backgrounds and 17 percent for students from low educational backgrounds. (See Table 4.)

In science, 12 percent fewer African-American and 12 percent fewer white students performed below basic at high-implementation schools than at low-implementation schools. For students from high-educational backgrounds and low-educational backgrounds, the percentages were 14 and 13 percent fewer, respectively. (See Table 5.) **All subgroups of students had significantly higher academic achievement by being at high schools that have more fully implemented the *HSTW* design.**

Table 3
Differences in Reading Proficiency Levels by Ethnic and Parental Educational Backgrounds

	High-implementation Schools	Low-implementation Schools	Percentage-point Difference	All Network Schools
African-American Students				
Below Basic	19%	42%	-23%	34%
Basic	45	41	+4	42
Proficient	33	16	+17	22
Advanced	3	1	+2	2
White Students				
Below Basic	10	23	-13	22
Basic	34	35	-1	35
Proficient	44	35	+9	36
Advanced	12	7	+5	7
High-educational Background				
Below Basic	10	25	-15	
Basic	33	34	-1	
Proficient	45	34	+11	
Advanced	12	7	+5	
Low-educational Background				
Below Basic	17	32	-15	
Basic	42	41	+1	
Proficient	36	24	+12	
Advanced	5	3	+2	

Source: 2002 *HSTW* Assessment results for career-oriented students

Table 4
Differences in Distribution by Mathematics Proficiency Levels by
Ethnic and Parental Educational Backgrounds

	High- implementation Schools	Low- implementation Schools	Percentage- point Difference	All Network Schools
African-American Students				
Below Basic	49%	72%	-23%	64%
Basic	43	26	+17	32
Proficient	8	2	+6	4
Advanced	0	0	0	0
White Students				
Below Basic	26	39	-13	38
Basic	52	48	+4	47
Proficient	19	11	+8	13
Advanced	3	2	+1	2
High- educational Background				
Below Basic	27	43	-16	
Basic	50	45	+5	
Proficient	20	10	+10	
Advanced	3	2	+1	
Low- educational Background				
Below Basic	38	55	-17	
Basic	50	39	+11	
Proficient	11	5	+6	
Advanced	1	1	0	

Source: 2002 *HSTW* Assessment results for career-oriented students

Table 5
Differences in Science Proficiency Levels by Ethnic and Parental Educational Backgrounds

	High-implementation Schools	Low-implementation Schools	Percentage-point Difference	All Network Schools
African-American Students				
Below Basic	68%	80%	-12%	76%
Basic	27	16	+11	20
Proficient	5	4	+1	4
Advanced	0	0	0	0
White Students				
Below Basic	35	47	-12	47
Basic	38	33	+5	33
Proficient	23	18	+5	17
Advanced	4	2	+2	3
High-educational Background				
Below Basic	37	51	-14	
Basic	37	30	+7	
Proficient	22	17	+5	
Advanced	4	2	+2	
Low-educational Background				
Below Basic	54	67	-13	
Basic	31	24	+7	
Proficient	14	8	+6	
Advanced	1	1	+0	

Source: 2002 *HSTW* Assessment results for career-oriented students

There is further indication that high-implementation schools are more effective than low-implementation schools in raising student achievement. Four percent fewer African-American students at high-implementation schools than white students at low-implementation schools scored below the basic level in reading. (See Table 3.) Likewise, eight percent fewer students from low-educational backgrounds at high-implementation schools scored below the basic level in reading than students from high-educational backgrounds at low-implementation schools. A similar pattern occurs in mathematics — five percent fewer students from low-educational backgrounds at high-implementation schools scored below the basic level in mathematics than students from high-educational backgrounds at low-implementation schools. (See Table 4.) No similar distinctions between the two groups of schools occurred in science.

The mean reading, mathematics and science scores for all students — African-American and white — were significantly higher at high-implementation schools than at low-implementation schools. (See Table 6.) Also they were significantly higher than the mean scores for all schools in the *HSTW* network. The greatest difference in subgroup mean scores at the two groups of high schools occurred with African-American students. **Having African-American students in high schools that have more fully implemented the *HSTW* design clearly increases their chances and the chances of all students of meeting the performance goals.**

Not only do white and African-American students benefit from being in schools that have more fully-implemented the *HSTW* design, a similar pattern of differences was found for students from low- and high-educational backgrounds. These students had significantly higher achievement in reading, mathematics and science when compared to similar students from low-implementation schools. **By more fully implementing the *HSTW* design, schools can close achievement gaps regardless of students' ethnic or parental educational backgrounds.**

Table 6
Mean Scores on the 2002 *HSTW* Assessment by Students
at High- and Low-implementation Schools

	High- implementation Schools	Low- implementation Schools	Difference In Mean Scores	All Network Schools	<i>HSTW</i> Goal
All Students:					
Reading	287	272	+15	276	279
Mathematics	306	293	+13	296	297
Science	300	285	+15	288	299
African-American Students					
Reading	279	260	+19	267	279
Mathematics	295	280	+15	285	297
Science	284	265	+19	271	299
White Students					
Reading	290	278	+12	280	279
Mathematics	309	298	+11	301	297
Science	306	294	+12	295	299
Low- educational Background					
Reading	282	270	+12		279
Mathematics	301	288	+13		297
Science	293	279	+14		299
High- educational Background					
Reading	290	275	+15		279
Mathematics	309	297	+12		297
Science	305	291	+14		299

Source: 2002 *HSTW* Assessment results for career-oriented students

Differences between scores at high-implementation and low-implementation schools are significant at the .01 level.

Reading proficiency levels: Below Basic (261 or lower), Basic (262-287), Proficient (288-316), Advanced (317 -500)

Mathematics proficiency levels: Below Basic (296 or lower), Basic (297-327), Proficient (328-348), Advanced (349-500)

Science proficiency levels: Below Basic (298 or lower), Basic (299-325), Proficient (326-351), Advanced (352-500)

Why do career-oriented students at high-implementation schools perform better than career-oriented students at low-implementation schools?

At the heart of why the high-implementation schools have made greater progress in improving student achievement are the differences in rigor of what is taught and in classroom expectations. Also significant are the differences in how teachers teach to make content relevant, how teachers support students in meeting higher standards, and in a common vision that school leaders and teachers have for the school. The 50 high-implementation schools have made more progress because they have unlocked themselves from the complacency of the past. These top 50 schools have attached themselves to a new vision that more students can learn difficult content if educators get school and classroom practices right. **These schools have abandoned the old ability model of sorting many students into general and basic classes where their teachers have low expectations.**

The differences in achievement between the high-implementation and low-implementation schools can be directly attributed to the depth to which the two groups of schools have implemented the *HSTW* design. All schools want to improve, but few want to change to achieve improvement. The fact remains that to improve, schools must change and the high-implementation schools have made more changes. All school leaders and staff face the challenge of what steps to take to more fully implement a school improvement design. An improvement design is only as good as the implementation of it. **The high-implementation schools exemplify that the more completely the design is implemented, the higher the student achievement.**

The *HSTW*-recommended Curriculum

More students complete the HSTW-recommended curriculum at high-implementation schools than at low-implementation schools.

Schools can raise expectations and achievement by teaching all students what has been taught only to the best students in the past and by supporting teachers in learning how to do so. Changing course titles is easy. Teaching all students to the same high academic standards is more difficult. All students want to believe that school matters in their lives and that their lives matter to the school. Getting them to complete the *HSTW*-recommended academic core sends that message. It helps them meet higher performance standards more than any other single practice. The *HSTW*-recommended academic core for career-oriented students includes

- four credits in college-preparatory/honors English;
- four mathematics credits, including Algebra I, geometry, Algebra II and above;⁶
- three science credits at the college-preparatory level (or four credits in schools with a block schedule);⁷
- three years of social studies; and
- mathematics in the senior year

In addition to the academic core, *HSTW* recommends that students complete a concentration either in career/technical or academic studies. Such concentrations help focus students on their current studies and on the future. A career/technical concentration consists of four credits in a planned sequence of courses within a broad career field such as pre-engineering, health/medical science, etc.⁸

⁶ To get 85 percent of students meeting the *HSTW* mathematics performance goal, in fall 2002 the *HSTW* Board modified the recommended mathematics curriculum to include four years of mathematics, including at least Algebra I, geometry and Algebra II.

⁷ *HSTW* asks schools to require students to complete three science credits, including at least two laboratory-based science courses such as chemistry, physics, anatomy and physiology, and college-preparatory biology. *HSTW* recommends a fourth year of science for schools using a block schedule.

⁸ Although this report is limited to students who completed a planned career concentration, *HSTW* does suggest schools also offer the following two academic concentrations: a mathematics and science concentration with four college-preparatory credits in each field, including at least one credit at the Advanced Placement level; a humanities concentration with four credits each in college-preparatory-level English and social studies, with at least one credit at the Advanced Placement level and four additional credits in a foreign language, fine arts, journalism, debate, etc.

The percentages of students completing the recommended curriculum were derived from data collected in the winter of 2002 from all seniors or a sample⁹ of 55 or more at each participating *HSTW* high school who responded, under the guidance of monitors, to a survey of the specific English/language arts, mathematics and science courses those students would complete by graduation.

Students completed the recommended English/language arts curriculum if they completed four credits in college-preparatory/honors English. An English/language arts course was classified as college-preparatory-level and part of the recommended curriculum only if every student had the following experiences in that class:

- completed a major research paper each year,
- read an assigned book at least once each month and
- completed a short writing assignment at least once a month.

To be classified as having completed the recommended mathematics curriculum, students must have had four mathematics credits, including Algebra I, geometry, Algebra II and above. For an algebra course to count as college-preparatory Algebra I in the recommended curriculum, the student must have also taken two or more of the following courses: Algebra II, Geometry, Trigonometry, Algebra III, Mathematics Analysis, Advanced Mathematics, Pre-calculus, Calculus or Advanced Placement Mathematics.

⁹ Schools that selected a sample of 60 or more career/technical students to participate did so by following strict guidelines that included listing all senior students enrolled in career/technical programs, assigning each student a number and using a random number table to assist the school administrator in selecting 60 or more students to participate in the assessment.

Students were counted as having completed the recommended science curriculum if they completed three science credits, with two in laboratory-based science courses at the college-preparatory level. General Physical Science and regular Biology counted as college-preparatory science courses in the recommended curriculum only if every student had the following experiences at least monthly:

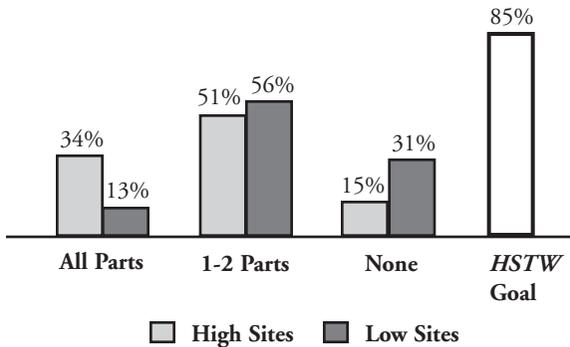
- used science equipment to do science activities in a laboratory with tables and sinks;
- read an assigned book (other than a textbook) or article dealing with science;
- completed a laboratory assignment in which he/she used science to address a problem found in the community; and
- prepared a written report of the results.

Teaching all high school students a solid academic core is at the heart of improving high school achievement. In most high schools, taking the college-preparatory academic core ensures that students have access to more rigorous content. It also means that students tend to receive better instruction and are immersed in learning environments that stress higher expectations. This accounts for much of the achievement results at high-implementation schools.

High-implementation schools place significantly more students into college-preparatory academic courses than do low-implementation schools. At high-implementation schools 34 percent of students completed all parts of the *HSTW*-recommended academic core, compared to only 13 percent at low-implementation schools. (See Figure 1.) **Having 21 percent more students who completed all parts of the recommended academic core is one reason why high-implementation schools had significantly higher student achievement than low-implementation schools.**

The gap between the two groups of schools in completing all parts of the recommended curriculum was even greater for African-American students — 32 percent. At low-implementation schools, only 10 percent of African-American students completed all parts of the recommended academic core, compared to 42 percent at high-implementation schools.

Figure 1
Percentages of Students Completing the *HSTW*-recommended Curriculum at High- and Low-implementation Schools by All Students

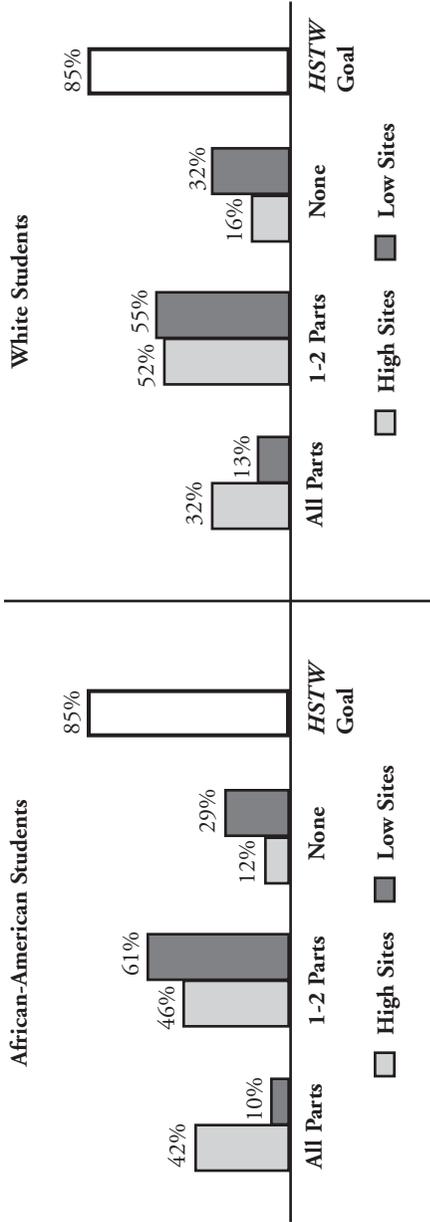


Source: 2002 *HSTW* Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.

(See Figure 2.) The greater percentages of African-American students completing all parts of the recommended academic core curriculum at high-implementation schools help explain why more African-American students at these schools met the *HSTW* performance goals than did African-American students at low-implementation schools. Furthermore, the high-implementation schools made more progress in getting African-American students to complete the recommended curriculum than they did white students. (See Figure 2.) High-implementation schools are close to the halfway point in reaching the *HSTW* goal.

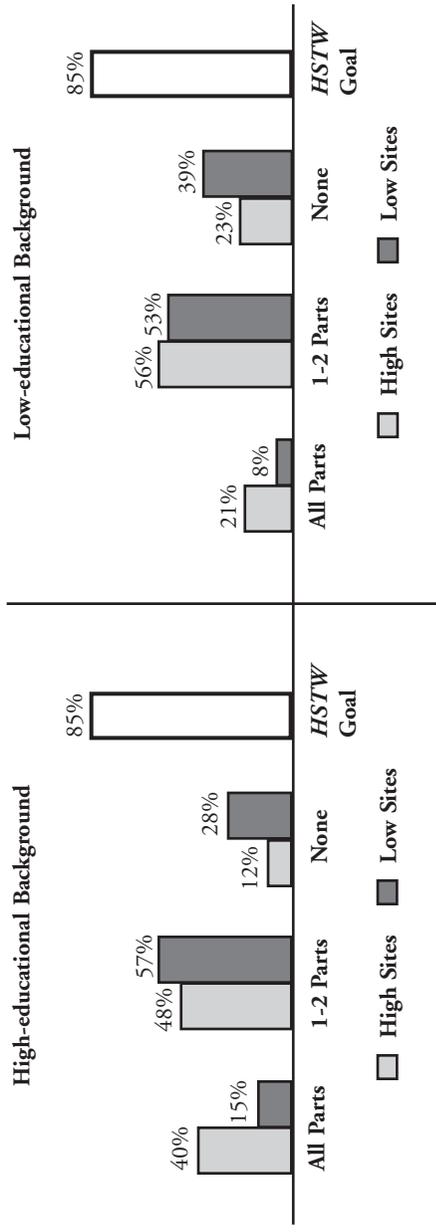
The same pattern of differences between high-implementation and low-implementation schools in course-taking patterns occurred among low-educational groups. (See Figure 3.) However, career-oriented students from high-educational backgrounds at high-implementation schools were twice as likely to complete all parts of the *HSTW*-recommended curriculum than were students from low-educational backgrounds at high-implementation sites.

Figure 2
Percentages of Students Completing the Recommended Curriculum
at High- and Low-implementation Schools by Ethnicity



Source: 2002 *HSTW* Assessment results for career-oriented students. The differences between the distributions of the two groups of schools are significant at the .01 level.

Figure 3
Percentages of Students Completing the HSTW-recommended Curriculum at High- and Low-implementation Schools by Parental Educational Backgrounds



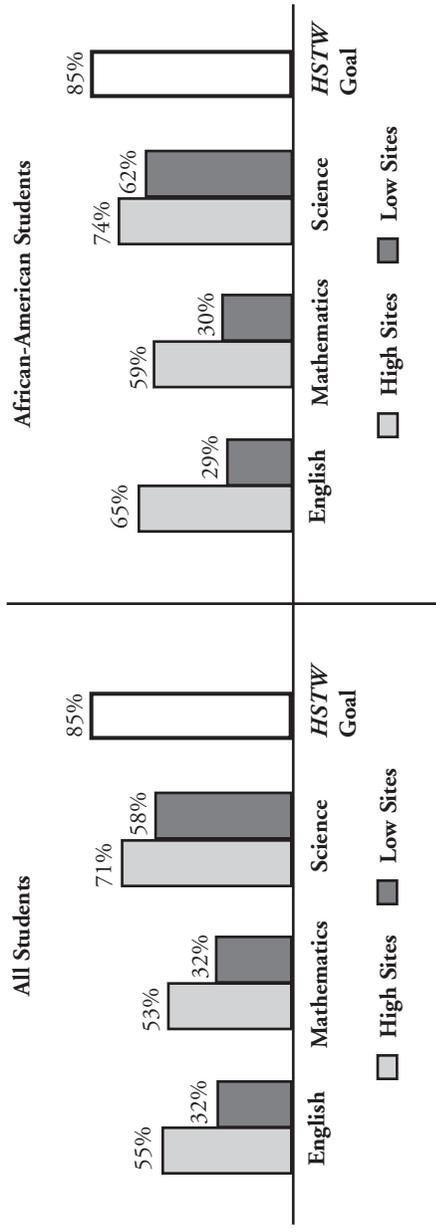
Source: 2002 HSTW Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.

Did the two groups of schools differ greatly in getting students to complete individual parts of the recommended curriculum? Twenty-three percent more students finished four years of college-preparatory-level English/language arts at high-implementation schools than at low-implementation schools. The gap between the two groups of schools for African-American students completing college-preparatory English was 36 percent (See Figure 4.), 28 percent for students from high-educational backgrounds and 14 percent for students from low-educational backgrounds. (See Figure 5.)

At the high-implementation schools, 53 percent of students completed the recommended mathematics curriculum, compared to 32 percent at the low-implementation schools. The differences were more pronounced for African-American students in the two groups of schools. At high-implementation schools, 59 percent of African-American students completed the recommended curriculum, compared to only 30 percent at low-implementation schools. (See Figure 4.)

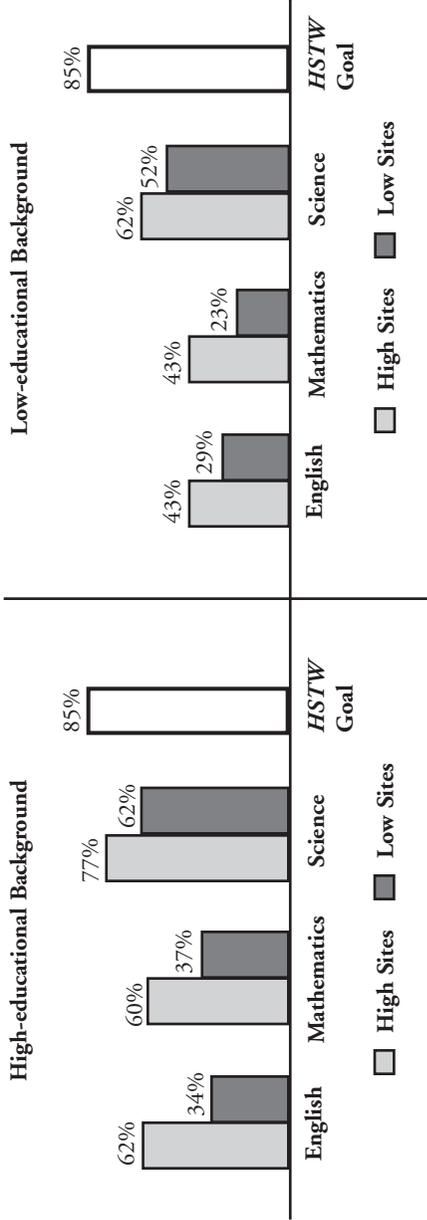
Mathematics achievement was significantly higher at the high-implementation schools in part because more students at these schools than at the low-implementation schools completed four years of mathematics beginning with Algebra I or higher. All students and all African-American students who completed a challenging mathematics curriculum at high-implementation schools had a mean mathematics score 20 points higher than students who did not. (See Table 7.) African-American students completing the *HSTW*-recommended mathematics curriculum at high-implementation schools had a mean score above the *HSTW* goal of 297. High-implementation schools have made more progress in unlocking themselves from past practices of teaching different groups of students to different standards, but can make even more progress in deeply implementing the *HSTW*-recommended mathematics curriculum. The effectiveness of high-level courses depends on holding students to high standards, giving some students the necessary extra help they need to meet standards, and using more engaging and authentic assignments that motivate students to learn challenging content.

Figure 4
Comparison of High- and Low-implementation Schools by Percentages of Students
Completing the Recommended Curriculum Subject Areas



Source: 2002 *HSTW* Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.

Figure 5
Comparison of High- and Low-implementation Schools by Percentages of Students
Completing the Recommended Curriculum Subject Areas by Parental Educational Backgrounds



Source: 2002 HSTW Assessment results for career-oriented students

Table 7
Mean Scores for Students by Completing or Not Completing the Recommended Mathematics Curriculum at High-Implementation and Low-implementation Schools

Completed recommended mathematics curriculum	All Students		African-American Students	
	High-implementation Schools	Low-implementation Schools	High-implementation Schools	Low-implementation Schools
Yes	315	307	303	291
No	295	286	283	275
<i>HSTW</i> Mathematics Goal	297	297	297	297

Source: 2002 *HSTW* Assessment results for career-oriented students

At high-implementation schools, 71 percent of students completed the *HSTW*-recommended science curriculum, compared to 58 percent at low-implementation schools. Twelve percent more African-American students at high-implementation schools than at low-implementation schools completed the recommended science curriculum. (See Figure 4.) However, 77 percent of students from high-educational backgrounds completed the recommended science curriculum, compared to only 62 percent of those from low-educational backgrounds at high-implementation schools. (See Figure 5.) The differences in science achievement between low- and high-implementation schools were due in part to having more students at high-implementation schools complete the *HSTW*-recommended science curriculum.

High-implementation schools are making significantly more progress than low-implementation schools in enrolling students from low-educational backgrounds into each of the *HSTW*-recommended curriculum areas. **High-implementation schools are more effective in enrolling African-American students and those with high-educational backgrounds into the *HSTW*-recommended curriculum than they are in enrolling students from low-educational backgrounds.** For example, at the high-implementation schools, 12 percent fewer students from low-educational backgrounds than all students completed the recommended

English curriculum, 10 percent fewer completed the recommended mathematics curriculum and nine percent fewer completed the recommended science curriculum. **All schools need to make a greater effort to enroll more students from low-educational backgrounds into the recommended curriculum.**

Southwest Guilford High School, High Point, North Carolina

*An example of a high-implementation school in which most students complete all parts of the HSTW-recommended curriculum is Southwest Guilford High School. Sixty-seven percent of the students at this school are white and 33 percent are minorities. **Southwest Guilford has raised the bar by getting 100 percent of its students to complete the recommended English/ language arts curriculum, 98 percent the recommended science curriculum and 93 percent the recommended mathematics curriculum — three credits in mathematics, with two in college-preparatory algebra or higher.** Lori Braxton, assistant principal, said, “Our principals and teachers know that teaching the HSTW-recommended academic core is a priority for the school district.” Every student at the school is enrolled in either a college-tech-prep or a college-university-prep program of study. Guilford County does not offer the state’s career-prep diploma for graduation because the requirements are not tough enough.*

To accomplish this goal, school leaders and staff examined the curriculum, found that students had too many low-level options and eliminated every low-level course. School leaders organized an instructional support team that meets weekly to discuss how to prepare all students for education and careers after high school. Each student meets with his or her counselor in the spring to review the student’s program of study. The counselors don’t just invite students to consider taking Honors or AP courses. They ask, “Which higher level courses are you taking?” Every student is expected to take a full academic load during the senior year. The school also educates students and their parents about the need for a four-year plan of high-level courses. Forty-six percent of students at this school met all three performance goals, compared to 34 percent at the low-implementation sites. Seventy-two percent of its students met the mathematics performance goal and 71 percent met the science performance goal.

Academic Knowledge and Skills

More students complete more career/technical credits with greater emphasis on using academic knowledge and skills to do challenging assignments at high-implementation schools than at low-implementation schools.

School leaders and more career/technical teachers at high-implementation schools understand that the purpose of high school career/technical studies is to produce graduates who can demonstrate the following technical literacy¹⁰ knowledge and skills:

- use technology to perform workplace tasks and projects;
- demonstrate understanding of technical concepts, principles and procedures;
- read, understand and communicate in the language of their career fields; and
- use mathematical reasoning and understanding to solve problems in a career field.

High-implementation schools provide students greater access to a richer and more challenging set of learning experiences in their career/technical classes than do low-implementation schools. Thirteen percent more students at high-implementation schools than at low-implementation schools completed four or more technical courses in a career/technical concentration (92 percent compared to 79 percent, respectively).

¹⁰ Technical literacy is defined as being able to do the following: read, analyze, interpret, communicate and use writing in a career/technical field; use mathematics to solve problems in the field; apply the processes and skills of science, including methods of inquiry, logic and accuracy, and a knowledge of models, systems, and patterns of change; and understand and apply the technical content and use the terms, concepts, and procedures of the career field to find solutions to problems and to perform necessary tasks.

Technical Literacy

The following 12 indicators are used to determine the emphasis on technical literacy that students experience in their career/technical classes. A student with eight to 12 of these experiences is considered to have had an intensive emphasis; five to seven a moderate emphasis; and zero to four a low emphasis on technical literacy.

Twelve Indicators for Technical Literacy

Students said they:

- Spent **one hour or more** reading non-school-related materials in a typical week.
- Completed **four or more credits** in career/technical courses in high school.
- Used mathematics to complete challenging assignments **at least weekly** in their career/technical classes.
- Read and interpreted technical books and manuals **at least weekly** to complete career/technical assignments.
- Read career-related articles **at least monthly** and demonstrated understanding of the content.
- Used computer skills **at least monthly** to do assignments in their career/technical studies.
- Had challenging assignments in career/technical classes **at least monthly**.
- Completed projects that required some research and a written plan.
- Had to meet certain standards on written exams to pass the course.
- Completed senior projects that included researching a topic, creating a product or performing a service, and presenting it to the class or others.
- Spoke with persons in careers to which they aspire.
- Spent **two or more hours** on homework each week assigned by career/technical teachers.

Students had higher achievement at high-implementation schools than at low-implementation schools because more students had intensive technical literacy experiences¹¹ that included completing four or more credits in a planned sequence of career courses. At the high-implementation schools, 44 percent of students had intensive technical literacy experiences in their career/technical classes, compared to 24 percent at low-implementation schools. (See Figure 6.) Only 13 percent of students at high-implementation schools had low technical literacy experiences in career/technical classrooms compared to 28 percent at low-implementation schools. The difference for African-American students in these two groups of schools was very similar to that for all students.

More students, including African-American students, at high-implementation schools than at low-implementation schools are required to use academic knowledge and skills to complete assignments in their career/technical classes. (See Table 8.) They are given more assignments that require them to:

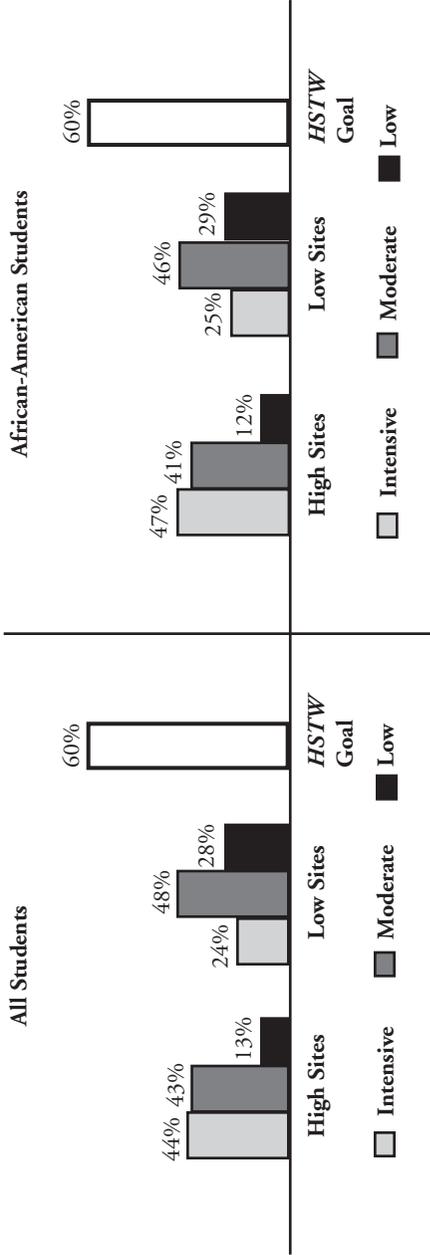
- read technical materials,
- use mathematics,
- read related technical articles,
- do research and
- develop written plans for projects assigned.

For example, a higher percentage of students at high-implementation schools used computers at least weekly to complete career/technical assignments — 68 percent compared to 53 percent, respectively.

More vocational teachers in the high-implementation schools engaged students in learning that connects academic studies to students' future career goals. A higher percentage of students at high-implementation schools had the opportunity to talk with people from their chosen fields (75 percent compared to 63 percent, respectively). This motivates students to learn the more demanding academic core curriculum because they can see how it is connected to their own lives and goals.

¹¹ To know when schools have fully implemented the *HSTW* design, *HSTW* has set the goal of 85 percent of students achieving the reading, mathematics and science performance goals on the *HSTW* Assessment. For curriculum, school and instructional practices, *HSTW* has set goals ranging from 60-85 percent of students reporting having had intensive levels of given learning experiences on the *HSTW* Student Survey.

Figure 6
Percentages of Students by the Emphasis on Technical Literacy in Career/Technical Studies at High- and Low-implementation Schools



Intensive: eight to 12 indicators Moderate: five to seven indicators Low: four or fewer indicators

Source: 2002 *HSTW* Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.
 The *HSTW* goal for the emphasis on technical literacy is 60 percent.

Expectations in career/technical classrooms were higher at high-implementation than at low-implementation schools. More students at high-implementation schools were given assignments that develop independent learning skills and were held accountable for meeting course standards. For example, higher percentages of students at high-implementation did homework, completed senior projects, met standards on end-of-course exams and read outside of class. (See Table 8.) **Simply stated, more students at the higher-achieving schools were enrolled in vocational programs with a stronger emphasis on advancing students' technical literacy achievement.**

Columbiana County Technical Center, Lisbon, Ohio

Columbiana County Technical Center is a high-implementation school that has improved the quality of its career/technical programs by making the improvement of technical literacy achievement a top priority. Teachers at the center are concerned about the technical literacy achievement of their students. They make sure that all students are able to read, write and use mathematics in their career fields of study. Teachers work hard to encourage students to read inside and outside of school by surrounding them with books, magazines and other printed materials in all classrooms and laboratories. They also assign projects that require students to apply the mathematics they have learned. They encourage students to become independent learners by requiring each student to complete a senior project that involves conducting research, creating a project or performing a service, writing a report and making a formal presentation of the results.

They hold students accountable by expecting all students to meet and exceed the benchmarks on Ohio's end-of-program career/technical exams. In 2002-2003, students exceeded the state benchmarks in all but two of the center's 15 career majors. Principal Frank Blankenship said, "We are all working to make sure students in those two areas meet the standards next year."

Columbiana's teachers' efforts are having positive consequences. Between 2000 and 2002 on the HSTW Assessment, the mean reading score increased from 255 to 287, the mean mathematics score from 290 to 299 and the mean science score from 273 to 302. The assessment also documented that the percentage of its students using mathematics to complete career/technical assignments each week increased from 29 percent to 42 percent; and the percentage of students presenting assignments to their class each month increased from 24 percent to 42 percent.

Beginning with the 2003 graduates, the center offers two types of graduation certificates — a Certificate of Completion for finishing a career/technical program and an Honors Certificate for students who perform exceptionally well regarding grades, school attendance and the state career/technical competencies exams.

Columbiana County Technical Center illustrates how quality career/technical standards can motivate students to work harder both in academic and career/technical studies. Many students are not motivated to study hard to get into prestigious colleges or to earn high school diplomas. What motivates them is to acquire the knowledge and skills necessary to be able to compete for better jobs. It appears that high-implementation schools have used career/technical studies to enhance students' motivation to work harder in achieving higher standards.

Work-site Learning

At high-implementation schools, significantly more students had a richer set of work-site learning experiences with seasoned mentors who gave them job-specific instructions on how to do the work, how to do the required mathematics, good work habits and good customer relations.

Quality work-site learning can help students believe that high school is the path to a better future. At high-implementation schools, compared to low-implementation schools, significantly more African-American students reported having work-site learning experiences in which the employer shows them how to use mathematics and communications skills on the job. (See Table 9.) Similar patterns between the two groups of schools occurred for students regardless of their parental educational backgrounds. (See Table 10.)

Many schools permit students, especially seniors, to leave school early for part-time jobs. This practice does little to advance students' academic and technical knowledge. On the other hand, giving students access to work-based learning integrated with school-based learning and planned cooperatively by educators and employers can enable students to acquire more meaningful knowledge and skills.

Table 8
Percentages of Students Having Various Career/Technical (CT)
Learning Experiences at High- and Low-implementation Schools

Indicator	High-implementation Schools		Low-implementation Schools	
	All Students	African-American Students	All Students	African-American Students
Completed four or more credits in CT studies.	92%	84%	79%	72%
Read one or more hours of outside reading each week.	44	43	38	34
Read technical materials weekly.	32	37	23	23
Read career-related articles each month.	59	66	44	45
Used mathematics weekly.	27	31	20	20
Used computer skills in CT classes monthly.	68	69	53	51
Spent two or more hours on CT homework each week.	16	13	10	13*
Had challenging CT assignments.	62	60	48	46
Planned a project and conducted research to complete it.	86	86	74	76
Had to meet standards on an exam to pass.	77	81	70	74
Required to do a senior project.	67	73	55	58
Spoke with someone in a career to which student aspired.	75	75	63	62

Source: 2002 *HSTW* Assessment results for career-oriented students
Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level, except were indicated with an asterisk (*).

Many schools permit students, especially seniors, to leave school early for part-time jobs. This practice does little to advance students’ academic and technical knowledge. On the other hand, giving students access to work-based learning integrated with school-based learning and planned cooperatively by educators and employers can enable students to acquire more meaningful knowledge and skills.

Table 9
Percentages of Students Having Quality Work-site Learning Experiences at High- and Low-implementation Schools

Indicator	High-implementation Schools		Low-implementation Schools	
	All Students	African-American Students	All Students	African-American Students
Had mentor who gave job instructions.	83%	84%	76%	72%
Had mentor who encouraged good work habits.	72	74	61	60
Had mentor who encouraged good customer relation skills.	74	76	62	60
Had employer who showed them how to use mathematics skills at on the job at least each month.	**	61	**	51
Had employer who showed them how to use communications skills on the job.	**	67	**	59

Source: 2002 *HSTW* Assessment results for career-oriented students
 Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level for all practices.

** Not statistically significant for this group

Table 10
Percentages of Students Having Quality Work-site Learning Experiences at High- and Low-implementation Schools by High- and Low-Educational Backgrounds

Indicator	High-implementation Schools		Low-implementation Schools	
	High-educational Background	Low-educational Background	High-educational Background	Low-educational Background
Had mentor who gave job instructions.	84%	83%	77%	78%
Had mentor who encouraged good work habits.	71	75	63	61
Had mentor who encouraged good customer relation skills.	74	75	66	58
Had employer who showed them how to use communications skills on the job.	61	63	58	55

Source: 2002 *HSTW* Assessment results for career-oriented students

Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level for all practices.

Queen Anne's County High School, Centreville, Maryland

Queen Anne's County High School enriches its work-site learning experiences to include assignments that prepare students to perform as professionals. *Work-based learning at this high-implementation school is designed for students who are serious about academic and technical achievement and are pursuing strong academic and career programs of study. At least 50 percent of all 11th- and 12th-grade students at the school participate in work-site learning opportunities. More than 60 employers provide learning experiences for students in high-demand career fields such as construction, agriscience, automotive, health and business.*

Queen Anne's students earn credit toward graduation only if the work-based learning is aligned with a planned program of study. All work-site learning programs include a plan that helps students develop a range of academic and technical skills. Teachers and employers together develop assignments for students in different departments.

Students participating in internships and supervised career orientation work-based learning must

- *be passing all academic and career/technical courses and have good attendance records;*
- *understand that when his or her grade falls below "C" in any class, the student must terminate the employment and return to a full-time classroom schedule at the school;*
- *participate in interviews and are hired only if they meet the employers' business needs;*
- *assemble an employability portfolio that includes a résumé, a sample letter to an employer, an evaluation by a work-based learning employer, certificates and awards, progress reports, proof of career-area competencies and other documents related to the student's preparation and experience. Further, student portfolios must show the connection between what they learn at school and what they learn at work;*
- *complete a rigorous set of assignments that connect schoolwork with the responsibilities outlined in their job plans. Teachers who supervise these programs develop assignments and evaluation guides aligned to the Maryland Core Learning Goals and Maryland Skills for Success;*

- *keep a daily journal of hours worked, salary earned, task(s) assigned and skills acquired; and*
- *be observed by their work-based learning coordinator as they perform their duties.*

As a result of observations, both the student and the school receive a written report of the student's progress in gaining certain competencies on the job. The reports also inform the school whether the student is employable at the current level of training. If the student is not deemed employable, the school and the employer cooperate on a plan of action to make sure the student acquires the knowledge and skills needed to become a productive employee.

Students' employers do a final evaluation of job performance and rate students on attendance, punctuality, cooperation, courtesy, accuracy, work habits, personal appearance and job knowledge. The rating scale ranges from 1 to 4, with 1 being unacceptable and 4 being excellent.

Queen Anne's students confirmed the value of their high school work experiences on the 2002 HSTW Assessment, which indicated that many had high quality work-site learning opportunities. (See Table 11.)

Table 11
Percentages of Students Having Employers Provide Quality Work-site Learning Experiences to Students at Queen Anne's High School and at High-scoring Schools

Students' employers:	Queen Anne's County High School	High-scoring Schools
Helped them learn new technical skills each week.	53%	25%
Encouraged them to develop good work habits.	71	41
Encouraged them in their academic studies.	39	24
Encouraged them to develop good customer relations skills.	63	40
Showed them how to use communications skills on the job.	47	35

Source: 2002 HSTW Assessment report

High Expectations

More students experience classroom teaching with high expectations at high-implementation schools than at low-implementation schools.

Expecting more of students gives high-implementation schools an achievement edge over low-implementation schools. Teachers cannot teach a more demanding academic core or quality career/technical studies without raising school and classroom expectations. This involves making challenging and meaningful assignments and expecting students to do high-quality work. It requires teachers to be enthusiastic, dedicated and willing to provide the individual help students may need in meeting higher standards.

HSTW uses five indicators to determine the emphasis on high-expectation experiences. The indicators listed describe experiences that all students should receive in their classes. A student with four or five of these experiences is classified as having classes with an intensive emphasis on high expectations; two or three of these experiences a moderate emphasis; and one or none a low emphasis.

Five Indicators of the Emphasis on High Expectations

Students said

- Their teachers **often** clearly indicated the amount and quality of work necessary to earn a grade of “A” or “B” at the beginning of a project or unit.
- Their teachers were **frequently** available before, during or after school to help them with their studies.
- They spent **one or more hours** on homework each day.
- They **often** revised their essays or other written work several times to improve quality.
- They **often** worked hard to meet high standards on assignments.

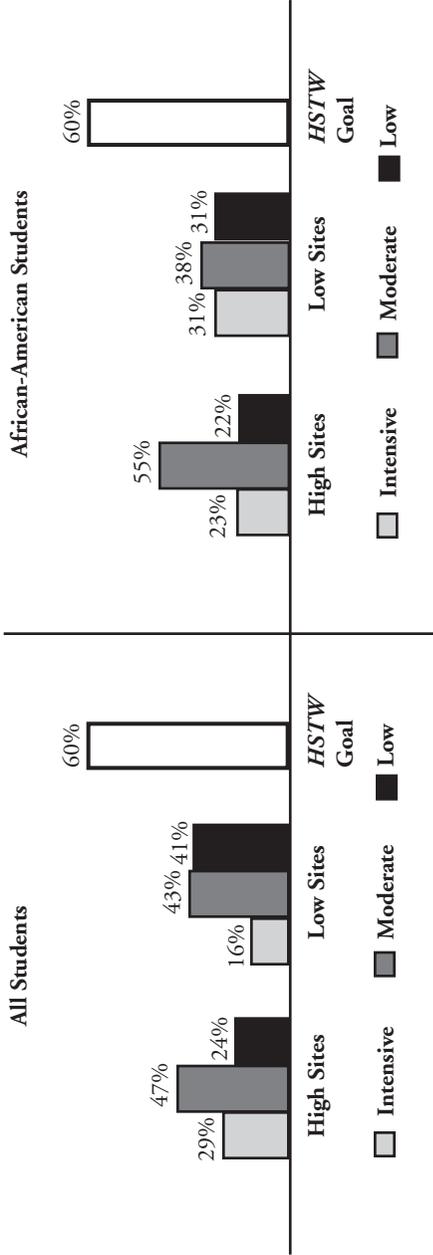
Seventeen percent more students at high-implementation schools than at low-implementation schools experienced classes with moderate to intensive experiences of high expectations. Twenty-four percent of students at high-implementation schools were in classes with low experiences of high expectations compared to 41 percent at low-implementation schools. At high-implementation schools, 78 percent of African-American students were in classes with moderate to intensive experiences of high expectations compared to 69 percent at low-implementation schools. (See Figure 7.) A similar pattern was found for students from low-educational backgrounds. Eighteen percent more students from low-educational backgrounds at high-implementation schools had moderate to intensive experiences of high expectations than did similar students at low-implementation schools. (See Figure 8.) High-implementation schools still have too many students in classrooms with moderate to low experiences of high expectations. The *HSTW* goal is to have 60 percent of students at all schools in classrooms with moderate to intensive experiences of high expectations.

Students at high-implementation schools compared to low-implementation schools were

- 13 percent more likely to have been in classrooms where the amount and quality of work was clear to earn a grade of an “A” or a “B” and where work must have been revised until it met standards;
- 11 percent more likely to have been in classrooms where they had to work hard to meet high standards and had teachers who were available to give them the extra help they needed to meet course standards; and
- 10 percent more likely to have completed one or more hours of homework daily. (See Table 12.)

A similar pattern of higher expectations was found for African-American students and for students from low-educational backgrounds.

Figure 7
Percentages of Students by the Emphasis on High Expectations at High- and Low-implementation Schools



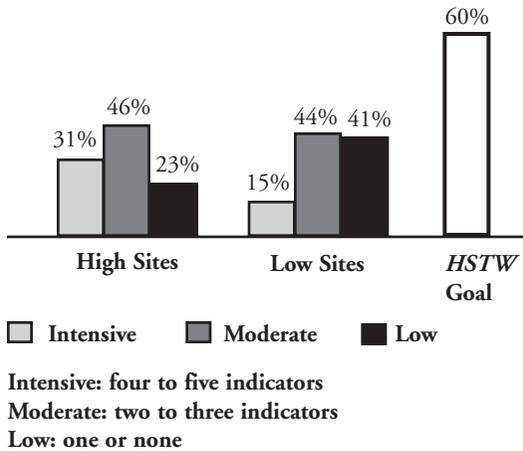
Intensive: four to five indicators

Moderate: two to three indicators

Low: one or none

Source: 2002 *HSTW* Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.
 The *HSTW* goal for the emphasis on high expectations is 60 percent.

Figure 8
Percentages of Students from Low-educational
Backgrounds by the Emphasis on High Expectations
at High- and Low-implementation Schools



Source: 2002 *HSTW* Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.
 The *HSTW* goal for the emphasis on high expectations is 60 percent.

Table 12
Percentages of Students Having High Expectations Experiences
at High- and Low-implementation Schools

	High- implementation Schools	Low- implementation Schools	Percentage- point Difference
All Students			
Teachers indicate the amount and quality of work required for an “A” or a “B.”	56%	43%	+13
Teachers are available for extra help.	66	55	+11
Students do one or more hours of homework daily.	32	22	+10
Students revise their written work.	48	35	+13
Students work hard to meet high standards.	55	44	+11
African-American Students			
Teachers indicate the amount and quality of work required for an “A” or a “B.”	62	47	+15
Teachers are available for extra help.*	64	57	+7
Students do one or more hours of homework daily.	41	26	+15
Students revise their written work.	52	37	+15
Students work hard to meet high standards.	59	48	+11
Students from Low-educational Backgrounds			
Teachers indicate the amount and quality of work required for an “A” or a “B.”	57	43	+13
Teachers are available for extra help.	68	57	+11
Students do one or more hours of homework daily.	33	22	+11
Students revise their written work.	50	36	+14
Students work hard to meet high standards.	50	44	+6

Source: 2002 *HSTW* Assessment results for career-oriented students
Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level for all practices, except where otherwise noted.

*The difference in the two groups is significant at the .05 level.

Benjamin Mays High School, Atlanta, Georgia

Leaders and teachers at Benjamin Mays High School, a minority/majority high school, have undertaken several efforts to raise expectations of their students. “We do a great deal to communicate high expectations to all students, their parents and to teachers,” said Principal Tyrone Smith. The school has a reputation in the community for having hard-working students. School staff and students frequently communicate the school’s high expectations to all new students and their parents. Ninth-graders learn the importance of doing their best and working hard to produce high-quality work through a character education program that is part of their civics class. All teachers are expected to reinforce the expectation of producing high-quality work. One school leader said, “We can’t be satisfied with being a good school; we want to be the best school we can possibly be and we want all of our students to believe that they are at school to do their very best.”

School goals are aligned with the district goals for improving student achievement. For example, the English/language arts department has developed common rubrics for grading student writing. To help students learn more challenging content, teachers use departmental meetings to review student work and to discuss how to improve it. Teachers work within each department to develop common unit tests and end-of-course exams.

May’s career/technical students’ responses to the Student Survey of the 2002 HSTW Assessment confirm that this high school has done much to raise expectations of students. (See Table 13.)

Table 13
Percentages of Students Having High Expectations Experiences at Benjamin Mays High School and All HSTW Schools

Students said	Mays High School	All HSTW Schools
Their teachers often indicated the amount and quality of work necessary to earn an “A” or “B.”	74%	45%
They usually did one or more hours of homework each day.	51	23
They often revise their written work to improve its quality.	58	34
They must complete senior projects that include researching a topic, creating a product or performing a service and presenting the results.	82	56
Their teachers would not let them get by without doing the work.	42	30
Teachers set high standards and were willing to help them meet the standards.	90	77

Source: 2002 HSTW Assessment results for career-oriented students

The Mays faculty is encouraged by the school district to raise expectations. In 1999, Beverly Hall, the superintendent of Atlanta Public Schools, undertook a districtwide initiative to raise expectations for all — students, teachers, school leaders and parents. She established three priorities for the next five years — increase the reading and mathematics achievement, increase the numbers of students in upper-level classes, and increase student attendance. To help accomplish these, district leaders developed a report card with several indicators to gauge each school’s success in improving achievement. Progress on the indicators became part of the evaluation of the principal and staff. The district targeted annual staff development programs in the areas with the least progress. In setting the context, Hall indicated, “We are looking for incremental progress over time.” Among the indicators used in the report card are the first-time passing rates on the state high school graduation tests in English, mathematics and writing; the percentages of students absent 10 days or more; the percentages of students enrolled in college-preparatory and Advanced Placement courses; the percentages of students taking the SAT; and the percentages of seniors who score 1,000 or more on the combined verbal and mathematics portions of the SAT.

Having high expectations is making a difference at Benjamin Mays. Between 2000 and 2002, career/technical students' mean scores on the HSTW Assessment increased from 278 to 290 in reading, from 294 to 306 in mathematics and from 279 to 298 in science. The 2002 mean scores exceeded the HSTW goals in all three areas. Between 2000 and 2002 the school also increased the percentages of students passing the Georgia High School Graduation Tests on the first administration in English/language arts, mathematics and social studies by three to four percentage points and exceeded the state means in all three areas. Mays' class of 2002 had a high school completion rate of 82 percent compared to 73 percent for the state of Georgia.

The Importance of High School

More students at high-implementation schools than at low-implementation schools experienced an emphasis on the importance of their high school studies.

High school students respond to school culture. If they perceive that teachers care about them and will not let them get by without doing the work, then they think that they are valued and that what they are being taught is of value. High school students who view their classes as engaging, exciting and carried out in an adult-like manner are more likely to work harder in school. Students who see connections between their high school experiences and next steps beyond school are more likely to do their best and take the courses that will best prepare them for that step. **The school culture as perceived by students can either energize them to do their best or it can produce apathy and a view of high school as a place to hang out and pass time until graduation.**

HSTW uses 10 indicators to determine the emphasis on creating a school culture that results in students doing their best to make the most of their high school years. Students with eight to 10 of these experiences were considered to have had an intensive emphasis on helping them understand the relevance of high school to their futures. Students with four to seven of these experiences were considered to have had a moderate emphasis, and students with three or fewer of these experiences a low emphasis.

Ten Indicators of Emphasis on the Importance of High School Studies

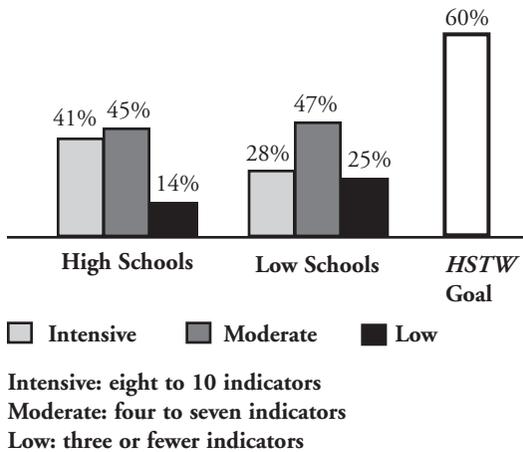
Students said

- their courses are **often or sometimes** exciting and challenging.
- they **often** tried to do their best work in school.
- they **seldom or never** failed to complete or turn in their assignments.
- most teachers **often** encouraged them to do well in school.
- most teachers **often** expected them to do well in school.
- teachers **often** showed they cared about them by not letting them get by without doing the work.
- it is **very important** to study hard to get good grades.
- it is **very important** to participate actively in class.
- it is **very important** to attend all classes.
- it is **very important** to take a lot of college-preparatory classes.

Forty-one percent of the students at high-implementation schools, compared to 28 percent at low-implementation schools, had experiences that placed intensive emphasis on getting them to do their best work in school. (See Figure 9.) Seventy-two percent of the students in low-implementation schools experienced moderate to low emphasis, while only 59 percent of students at high-implementation schools had such experiences. Students who had intensive levels of experiences had significantly higher achievement in reading, mathematics and science than students who experienced moderate or low levels.

Figure 9
Percentages of Students by Experiences that Emphasize
the Importance of High School Work at High- and
Low-implementation Schools

Percentage of Students By Level of Cultural Experiences



Source: 2002 *HSTW* Assessment results for career-oriented students
 Differences between percentages at high-implementation and low-implementation schools are significant at the .01 level.
 The *HSTW* goal for the emphasis on the importance of high school is 60 percent.

School leaders and teachers can gain ideas on what they might do to motivate students by comparing the responses of students from high-implementation and low-implementation schools on the 10 indicators of the importance of high school. Fifty-five percent of the students at high-implementation schools, compared to 46 percent at low-implementation schools, thought it was very important to take college-preparatory classes and significantly more students at high-implementation schools found their classes exciting and challenging. (See Table 14.) Getting more students to complete the *HSTW*-recommended academic core is dependent, in part, on teachers who can teach classes in ways that make them exciting, challenging and relevant to students' lives and goals.

It is not just about taking the right academic courses. It is about helping each student develop the willingness to make the effort necessary to meet course standards. For example, 10 percent more students at high-implementation schools said they often tried to do their best, while nine

Table 14
**Percentages of Students Having School Culture Experiences
 that Motivate Them About the Importance of High School
 Work at High- and Low-implementation Schools**

Students said	High- implementation Schools	Low- implementation Schools
They experienced exciting and challenging courses sometimes or often .	81%	71%
They often tried to do their best.	62	52
They seldom or never failed to complete or turn in assignments.	72	67
Most teachers often encouraged them to do well in school.	58	46
Most teachers often expected them to do well in school.	66	53
Teachers would not often let them get by without doing the work.	38	28
They thought it was very important to study hard to get good grades.	75	66
They thought it was very important to participate actively in class.	63	54
They thought it was very important to attend all classes.	84	75
They thought it was very important to take a lot of college-preparatory classes.	55	46

Source: 2002 *HSTW* Assessment results for career-oriented students
 Differences between percentages are significant at the .01 level.

percent more said it was important to attend all classes and study hard to get good grades. **High-implementation schools are getting students to make a greater effort and take responsibility for their own learning.**

Taking more demanding courses and making a greater effort at high-implementation schools are due, in part, to teachers who encourage students and will not let them get by without doing the work. For example, 12 percent more students at high-implementation schools said they were encouraged by their teachers to do well and 13 percent more said their teachers often expected them to do well in school. Ten percent more said that the teachers would not let them get by without doing the work. **High-implementation schools are communicating to students that high school matters and that the faculty cares about them and their success.**

Literacy, Numeracy and Science Skills

More students are involved in more rigorous, challenging and real-world assignments at high-implementation schools than at low-implementation schools.

High-implementation schools have higher achievement in part because they have gone farther than low-implementation schools in creating a cross-curricular emphasis on using literacy, numeracy and science skills to advance learning in other subjects and in using real-world problems for teaching more complex concepts. Reading, mathematics and science are the tools for thinking and advancing learning in other disciplines — academic and technical. Knowledge and skills in literacy, numeracy and science are not confined to the English, mathematics and science classrooms, but are used across the curriculum to advance problem solving, acquisition of knowledge and answering questions in other discipline areas. These skills are tools that help students to make sense out of all content and to become independent learners. Getting students to apply academic skills to solve real-world problems helps them understand the importance of acquiring a command of even higher level skills that will help them adapt to changing economic conditions.

Literacy

The 10 indicators listed are used to determine a school's emphasis on literacy. They describe the literacy experiences that all students should have. A student with seven to 10 of these experiences had an intensive emphasis on literacy; a student with four to six a moderate emphasis; and a student with zero to three a low emphasis.

Ten Indicators of the Emphasis on Literacy

Students said they:

- **Often** used word-processing software to complete an assignment or project.
- **Often** revised their essays or other written work several times to improve their quality.
- Were asked **sometimes or often** to write in-depth explanations about a class project or activity.
- **Sometimes or often** had discussions or debates with other students about what they read in English/language arts classes.
- Read and interpreted technical books or manuals **at least monthly** to complete assignments in their career/technical area.
- Read an assigned book outside of class and demonstrated that they understood the significance of the main idea **at least monthly**.
- Spent two or more hours **weekly** reading non-school related materials outside of class.
- Completed short writing assignments of one to three pages in their English classes **at least monthly**.
- Completed short writing assignments of one to three pages in their science classes **at least monthly**.
- Completed short writing assignments of one to three pages in their social studies classes **at least monthly**.

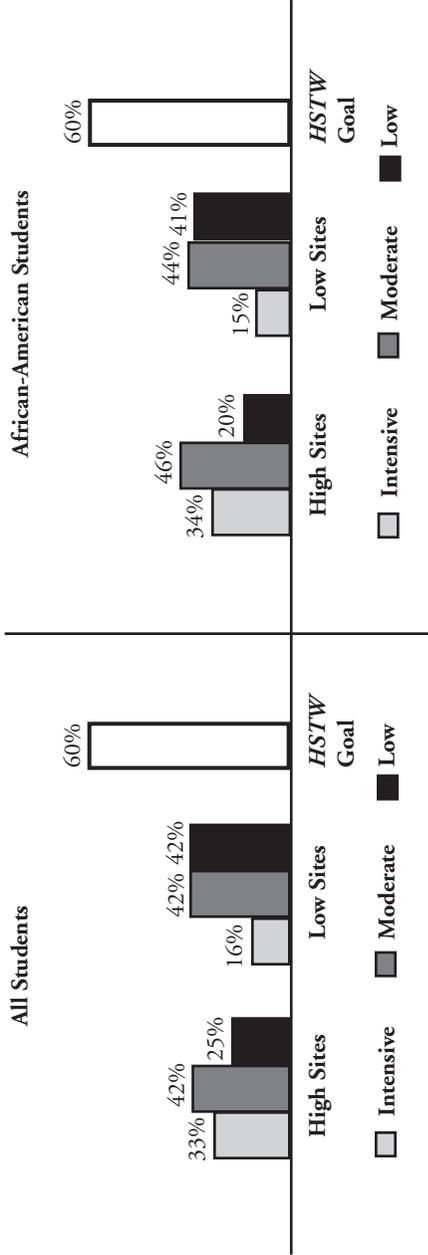
Seventy-five percent of the students at high-implementation schools, compared to only 58 percent at low-implementation schools, were in classrooms where moderate to intensive emphasis was placed on literacy strategies to advance their knowledge and understanding in the subject they were studying. (See Figure 10.) Simply put, to raise reading, academic and technical achievement, students will need to write research papers, do short writing assignments, make oral presentations, read several books or articles and use computers to complete assignments in all classes. Overall, high-implementation schools do a better job of engaging students in the written language of the subject being studied.

Students at high-implementation schools had higher reading achievement because they read more and wrote in-depth explanations about what they read, not only in English/language arts classes, but also in science and social studies classes. At high-implementation schools, students are 11 to 16 percent more likely than at low-implementation schools to be engaged in using various types of writing for learning across the curriculum. (See Table 15.) Furthermore, students at the high-implementation schools are

- seven percent more likely to have had opportunities to discuss what they read with their peers; and
- 15 percent more likely to have read a book each month outside of class and demonstrated they understand what they read and to have read technical materials in their career/technical classes to complete assignments.

The difference in literacy experiences at high-implementation sites, compared to low-implementation sites, was even greater for African-American students. **These significant differences in implementing literacy strategies across the curriculum, when coupled with more demanding courses, contributed to a more rigorous and intellectual environment that resulted in deeper student understanding of academic and technical content.** Greater use of literacy strategies across the curriculum places more students in roles that require them to think, interpret what they read, generate new understanding and better prepares them for adapting to new work settings. Students are limited in further learning, advancement and workplace opportunities when schools do not give them assignments that develop their capacity to integrate and apply information in different settings.

Figure 10
Percentage Distribution of Students by the Emphasis on Literacy Experiences
Across the Curriculum at High- and Low-implementation Schools



Intensive: seven to 10 indicators **Moderate: four to six indicators** **Low: three or fewer indicators**

Source: 2002 *HSTW* Assessment results for career-oriented students
 Differences between percentages are significant at the .01 level.
 The *HSTW* goal for the emphasis on literacy is 60 percent.

Table 15
Percentages of Students Having Literacy Experiences
at High- and Low-implementation Schools

Indicator	High-implementation Schools		Low-implementation Schools	
	All Students	African-American Students	All Students	African-American Students
Often used word processors to complete assignments.	61%	61%	45%	42%
Often revise written work for quality.	48	52	34	37
Frequently write in-depth explanations.	66	69	53	58
Discuss topics with other students.	63	68	56	61
Read technical materials in class each month .	64	66	49	48
Read a book outside of class each month .	40	47	25	31
Read for two hours or more outside of school each week.	24	19*	20	16*
Complete short writings for English class each month .	77	75	66	16
Complete short writings for science class each month .	39	39	27	16
Complete short writings for social studies class each month .	48	47	35	31

Source: 2002 *HSTW* Assessment results for career-oriented students

Differences in percentages between high-implementation and low-implementation schools are significant at the .01 level for all practices, except where otherwise noted.

*The difference between the two groups is not significant.

Sussex Technical High School, Georgetown, Delaware

Sussex Technical High School has become a top-performing HSTW school partly because of its emphasis on making reading and writing an integral part of all courses. All students take four years of college-preparatory-level English that emphasizes reading, writing, literature and higher order thinking skills. Entering ninth-graders who need more intense instruction take a reading course taught by a reading specialist in addition to their regular English course. Sussex Tech has only one level of English which requires each student to read eight to 10 books a year, write short papers weekly and do a major research paper. For their career/technical classes, all students are required to conduct research, write reports, make oral presentations and do book reports. Students also demonstrate their skills in writing and information gathering; and in analyzing and organizing through writing prompts and research papers in the ninth and 10th grades, junior research papers connected to students' career areas, and senior projects required for graduation.

The school is organized in such a way that academic and career/technical teachers work together to emphasize literacy skills through planned integrated projects and other joint assignments. Students have the same academic and career/technical teachers throughout high school. The school also provides an after-school tutoring program to help students strengthen their reading and writing skills. "These organizational features enable teachers to follow closely the progress of students, establish a good communications link with their parents and prevent students from "falling through the cracks," said Principal Sandy Walls-Culotta.

Efforts to improve students' literacy experiences are paying off. In 2002, Sussex Tech students exceeded the HSTW goals and the means of high-scoring HSTW schools in all tested academic areas. The school posted a mean reading score of 299 compared to a mean reading score of 277 for all schools in the HSTW network and 292 for high-scoring schools in the network with students similar to those at Sussex. Seventy-one percent of the school's students scored at the proficient or advanced levels in reading compared to 39 percent for all students in the network. Sixty-five percent of Sussex Tech's students had moderate to intensive literacy experiences in their classrooms, compared to only 45 percent for all students in the network.

Numeracy

Just as more intensive literacy experiences across the curriculum impact reading achievement, the same is true when students have intensive numeracy experiences. Students who take high-level mathematics courses, have engaging learning experiences, solve authentic real-world problems, study together and use mathematics in other classes have higher mathematics achievement than students without those experiences. Students who use mathematics to complete assignments in science, social studies and career/technical classes gain deeper understanding and have longer retention of mathematics knowledge and skills.

The 11 indicators listed help determine the emphasis on numeracy. They describe the numeracy experiences that all students should have. A student with eight to 11 experiences was classified as having had an intensive emphasis on numeracy; a student with four to seven a moderate emphasis; and a student with three or fewer a low emphasis.

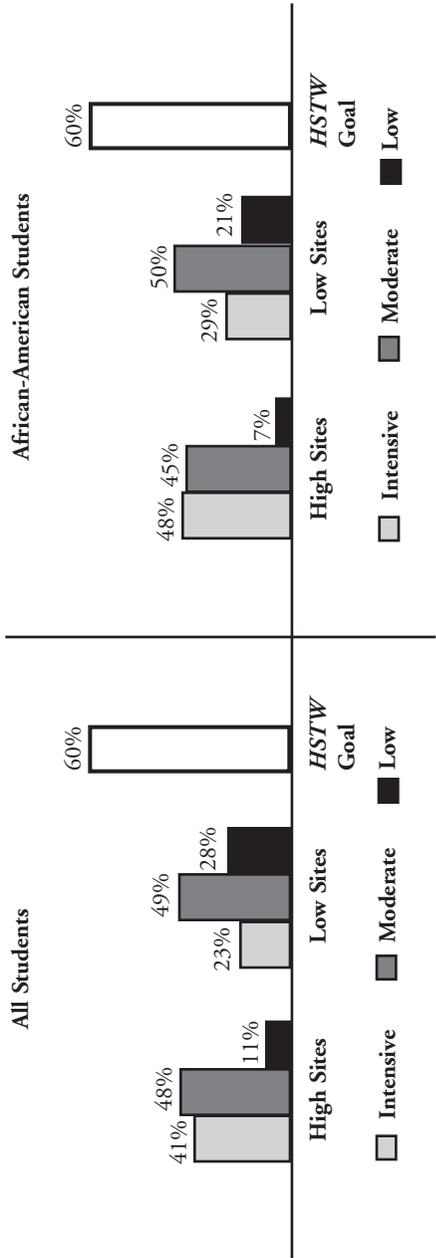
At high-implementation schools, 41 percent of the students had intensive numeracy experiences, compared to 23 percent at low-implementation schools. (See Figure 11.) In contrast, 28 percent of the students in low-implementation schools had low numeracy experiences across the curriculum compared to only 11 percent at high-implementation schools. The differences in students' experiences at these two groups of schools help explain why students at high-implementation schools had a mean mathematics score of 306 compared to 295 at low-implementation schools.

Eleven Indicators of School Emphasis on Numeracy

Students said they:

- Took a mathematics class during their **senior year**.
- Took **at least four full-year courses** in mathematics in grades nine through 12.
- Had mathematics teachers who **sometimes or often** showed them how mathematics concepts are used to solve real-life problems.
- Used a graphing calculator **at least once a month** to complete mathematics assignments.
- Completed a mathematics project **at least once a month** in ways that most people would use mathematics in a work setting.
- Orally defended a process they used to solve a mathematics problem **at least once a month**.
- Worked with one or more students **at least once a month** on a challenging mathematics assignment and received a group and individual grade.
- Worked in groups **at least once a month** to brainstorm how to solve a mathematics problem.
- Solved mathematics problems with more than one answer **at least once a month**.
- Solved mathematics problems other than those found in the textbook **at least once a month**.
- Used mathematics **at least once a month** to complete challenging assignments in their career/technical areas.

Figure 11
Percentages of Students by the Emphasis on Numeracy Experiences
Across the Curriculum at High- and Low-implementation Schools



Intensive: eight to 11 indicators **Moderate: four to seven indicators** **Low: three or fewer indicators**

Source: 2002 *HSTW* Assessment results for career-oriented students
 The differences between the distributions of the two groups of schools are significant at the .01 level.
 The *HSTW* goal for the emphasis on numeracy is 60 percent.

Increasing mathematics achievement is about the number of mathematics courses taken, the level of courses taken and how mathematics is taught. One reason students in high-implementation schools had an 11-point higher mean mathematics score is that more students took the right mathematics courses, and more of them took mathematics the senior year. (See Table 16.) Compared to students at low-implementation schools, students at high-implementation schools were

- 21 percent more likely to complete four years of mathematics at the Algebra I level and higher;
- 19 percent more likely to complete four or more years of mathematics; and
- 11 percent more likely to take mathematics the senior year.

These differences in mathematics experiences were similar for African-American students.

Table 16
Percentages of Students Taking Courses that Strengthen Students’ Numeracy Experiences at High- and Low-implementation Schools

Indicator	High-implementation Schools		Low-implementation Schools	
	All Students	African-American Students	All Students	African-American Students
Four mathematics courses including Algebra I and higher*	53%	59%	32%	30%
Mathematics the senior year	73	77	62	65
Four or more mathematics courses	71	73	52	52

Source: 2002 *HSTW* Assessment results for career-oriented students
Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level.

* This item is not part of the numeracy index, but is an important related experience.

Compared to low-implementation schools, the high-implementation schools are more persistent in connecting mathematical reasoning and understanding to other courses and to experiences in students' lives outside of school. Significantly more students, including white and African-American students, at high-implementation schools than at low-implementation schools said their teachers link mathematics to real-life problems, assign problems outside of the textbook and in career/technical classes give weekly assignments that get students to use mathematics. Using real-world contexts to convince students why they need to work harder to learn high-level mathematics concepts establishes a sense of relevance for mathematics learning.

Students at high-implementation schools were also more likely to be in mathematics classrooms where oral strategies were frequently used to engage students in understanding mathematics procedures and concepts. (See Table 17.)

Teachers in high-implementation schools seem to have recognized the power of student peer groups working with each other to more deeply understand mathematics concepts and practices. For example, 10 percent more students at high-implementation than at low-implementation schools reported working frequently with other students on mathematics assignments. Further, 13 percent more students reported working in groups to brainstorm how to solve problems. Similar patterns were found for African-American students.

Finally, teachers in high-implementation schools made greater use of technology to engage students in learning mathematics concepts. For example, 16 percent more students at high-implementation than at low-implementation schools said they frequently used graphing calculators to complete course assignments in their mathematics classes. Similar patterns in how students are taught were reported by African-American students. **From visits to many low-implementation schools, it appears that these schools made greater use of drill sheets, omitted word and application problems in textbooks, seldom enriched classes with problems from outside of school, and used more teacher-centered instructional methods.**

Table 17
Percentages of Students Having Numeracy Experiences
at High- and Low-implementation Schools

Indicator	High-implementation Schools		Low-implementation Schools	
	All Students	African-American Students	All Students	African-American Students
Have mathematics teachers show how mathematics is used in real life.	74%	79%	66%	65%
Use a graphing calculator.	78	82	62	68
Solve work-related mathematics problems.	35	35*	29	32*
Orally explain mathematical processes used to solve problems.	34	43	24	31
Work with others on assignments.	51	59	41	44
Work in groups to brainstorm how to solve problems.	60	67	47	53
Solve open-ended problems.	71	77	58	65
Solve problems outside of the textbook.	71	76	55	57
Use mathematics in their CT assignments.	56	56	46	46

Source: 2002 *HSTW* Assessment results for career-oriented students
Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level, with the exception of one item, denoted by an asterisk (*).

Springdale High School, Springdale, Arkansas

Springdale High School gives its students strong numeracy experiences. This high-implementation school keeps mathematics uppermost on the minds of teachers and students. They do a good job in getting students to complete four years of the right mathematics courses, to learn how mathematics is connected to real-world situations, and to talk and use mathematics. All of Springdale's seniors participating in the 2002 HSTW Assessment had completed Algebra II and Geometry, 88 percent had completed Trigonometry and 45 percent had completed Pre-calculus. These efforts are effective with 86 percent of Springdale's students meeting the HSTW performance goal and only 14 percent at below the basic level in mathematics in 2002.

In 1996, teachers led an initiative to require four years of mathematics for graduation and to adopt a mastery learning approach in algebra and geometry. The importance of mathematics is evident in classes such as biology, physics, chemistry, construction, and drafting and design. The mastery learning program in algebra and geometry is a competency-based program that has clear standards and provides multiple opportunities for students to learn mathematics skills. Low-achieving students are given extra time and help to meet the competency levels. Students who are unsuccessful at the end of the semester are re-grouped and required to repeat the course. Vickie Smith, a mathematics teacher and district coordinator, said, "For the past three years, we have been one of the state's highest-achieving high schools on the end-of-course mathematics exams."

Science Skills

Just as more intensive literacy and numeracy experiences improve reading and mathematics achievement, the same is true for science. **When students take more high-level science courses and take science the senior year, study together, conduct science laboratories, and read and write about science, students have higher science achievement.** The eight indicators determine the emphasis on a rich curriculum and learning experiences in science. These indicators describe the science experiences that all students should have. Students with six to eight of

Eight Indicators of School Emphasis on Science

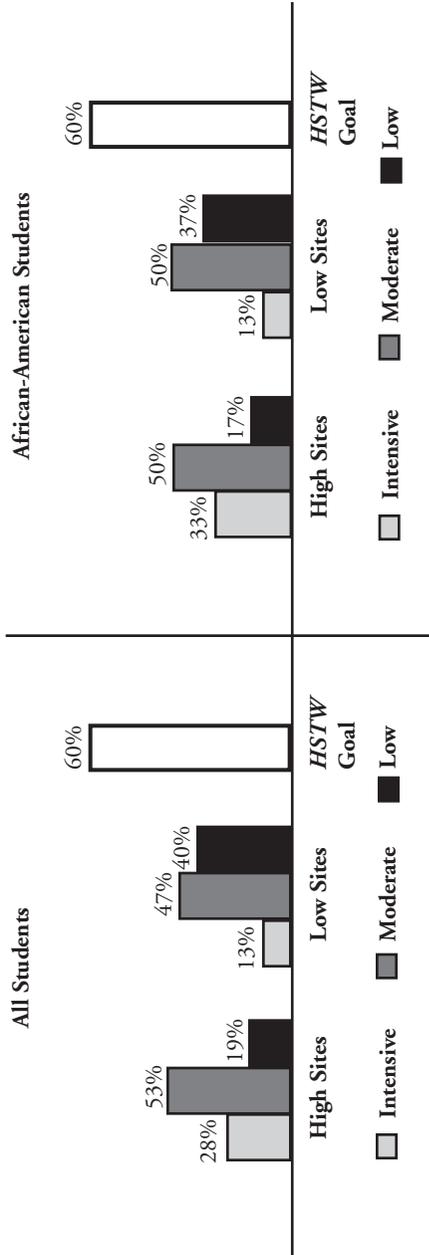
Students said

- They completed three of the following science courses: College-preparatory Physical Science, College-preparatory Biology/Biology 2, Anatomy, College-preparatory Chemistry, Physics or AP Science.
- Science teachers **often** showed how scientific concepts are used to solve problems in real life.
- They took a science course in the **senior year**.
- They used science equipment to do science activities in a laboratory with tables and sinks **at least weekly**.
- They read an assigned book (other than textbook) or article dealing with science **at least monthly**.
- They used science equipment to do science activities in class **at least monthly**.
- They worked with one or more students on a challenging science assignment **at least monthly**.
- They prepared written reports of laboratory results in science **at least monthly**.

these experiences were considered to have had an intensive emphasis on science; students with three to five a moderate emphasis; and students with two or fewer a low emphasis.

All students, including African-American students, in high-implementation schools took more of the right science courses and experienced more engaging assignments in science classes than students in low-implementation schools. At high-implementation schools, 81 percent of students had moderate to intensive emphasis on science, compared to 60 percent of students at low-implementation schools. (See Figure 12.) Forty percent of students in low-implementation school had low emphasis compared to only 19 percent at the high-implementation schools.

Figure 12
Percentages of Students by Emphasis on Science
at High- and Low-implementation Schools



Intensive: six to eight indicators

Moderate: three to five indicators

Low: two or fewer indicators

Source: 2002 *HSTW* Assessment results for career-oriented students

Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level. The *HSTW* goal for the emphasis on science is 60 percent.

At high-implementation schools, students were 12 percent more likely to have taken at least three of the following science courses — College-preparatory Physical Science; College-preparatory Biology/Biology 2; Anatomy; College-preparatory Chemistry, Physics or AP Science. (See Table 18.) **African-American students at high-implementation schools were 23 percent more likely to take three of these science courses.**

High-implementation schools also did a better job than low-implementation schools in giving students more hands-on and real-life learning experiences and getting students to make greater use of literacy skills in deepening their science content knowledge. For example, at high-implementation schools:

- 15 percent more students completed a science laboratory **weekly**;
- 17 percent more students used science equipment to do science activities in the classroom **at least once a month**;
- 11 percent more students linked their science concepts to real-life situations;
- 17 percent more students worked with other students on completing a challenging science assignment **at least monthly**;
- nine percent more students read science-related materials other than the textbook **at least monthly**; and
- 12 percent more students prepared written science reports **at least monthly** on laboratory results in science.

These differences in science experiences were similar for African-American students.

Table 18
Percentage of Students Having Various Science Experiences
at High- and Low-implementation Schools

Indicator	High-implementation Schools		Low-implementation Schools	
	All Students	African-American Students	All Students	African-American Students
Completed three of the following science courses (CP Physical Science; CP Biology; Biology 2; Anatomy, CP Chemistry, Physics or AP Science).	35%	43%	23%	20%
Science teachers often show how scientific concepts are used in real-life situations.	39	41	28	32
Took science the senior year .	67	71	45	51
Used science equipment to do science activities in a laboratory with table and sinks at least weekly .	41	38	26	25
Read an assigned book (other than text book) or article dealing with science at least monthly .	44	50	35	39
Used science equipment to do science activities in the classroom at least monthly .	77	76	60	57
Worked with one or more students on a challenging science assignment at least monthly .	74	75	57	58
Prepared a written report of laboratory results in science at least monthly .	53	52*	41	53*

Source: 2002 *HSTW* Assessment results for career-oriented students
Differences in percentages between high-implementation schools and low-implementation schools are significant at the .01 level, with the exception of one item, denoted by an asterisk (*).

Barnwell High School, Barnwell, South Carolina

Teachers at Barnwell High School bring science to life as students take more courses and complete more projects. *The dedication of science teachers at this high school is ensuring that more students learn essential scientific principles. The required curriculum includes high-level science courses, a three-year science project, much laboratory work and a heavy emphasis on hands-on learning. In a small community of fewer than 10,000 people, Barnwell High School has an enrollment of 833 students in grades nine through 12.*

Five full-time and three part-time science teachers help students become investigators who ask questions and find answers. Science teachers took several steps to upgrade the science curriculum, including requiring students to pass a science graduation test, raising the graduation requirements from two to three science courses and reducing the number of students failing science.

Barnwell's science teachers require all students to have frequent laboratory experiences, do a lot of writing, and complete real-world-based projects. *Laboratory experiences are emphasized for students in all science courses. As a result, each student completes at least one practical application or investigative activity per unit. Teachers work together to build on students' laboratory experiences in subsequent science classes. For example, students may do a laboratory in physical science and a similar, but more in-depth, laboratory in chemistry. "This allows students to see the relevance of what they are learning and to expand on what they have learned," said science teacher, Lisa Wyndham. Science teachers also make individual **writing assignments** throughout their classes and include **short-answer or essay questions on all tests**. Each student begins the journey writing in ninth-grade Physical Science by completing at least one formal laboratory report each quarter. Teachers lead students step-by-step through how to prepare a written report in the first quarter but expect the students to become increasingly responsible for their reports as the year progresses. Students in Environmental Science write position papers on local environmental issues. They conduct research and find evidence to support a position. Then they write reports to outline the problem and present their views to the class and local audiences about how to solve the problem.*

Hands-on project-based learning is the norm in all science classes at Barnwell High School. The projects become increasingly difficult as students move through the science curriculum from grades nine through 12.

- **Ninth-grade** science students learn the concepts of force and gravity in making tabletop “spaghetti bridges.” The object of the assignment is to build the lightest bridge that will hold the greatest amount of weight. Students are graded on the design and strength of the bridge. In another project that is graded, students build model rockets to illustrate Newton’s Third Law of Motion.
- **Tenth-grade** biology students are assigned topics to research and summarize into pamphlets that they produce on computers in the business department. They are graded on the pamphlets’ contents and designs.
- **Eleventh-grade** chemistry students receive a list of scientists associated with the atomic theory and must do research and obtain information on each scientist. Each student writes a report, creates a visual aid and makes an oral presentation on one of the scientists.
- **Twelfth-grade** physics students build miniature roller coasters with marbles as passengers. They research the development of roller coasters as amusement park rides and find information on physics-related concepts, such as potential energy, speed and centripetal force. To understand two-dimensional motion, physics students also build catapults for launching ping-pong balls into target areas. The catapults must be adjustable for a variety of target ranges.

In support of project-based learning, Wyndham and two other science teachers (biology and chemistry) have developed a process beginning in grade nine that culminates in a science fair project in grade 11. The project involves about half of the students at Barnwell High School, including many career/technical students. Here is what the students do in each grade:

- **Ninth-grade** — Students identify independent variables, dependent variables, constants and controls in all labs completed in class. They practice describing problems and

writing hypotheses, procedures and conclusions. They also organize data in charts, and practice data analysis and interpretation.

- **Tenth-grade** — *Students learn how to use scientific journals and articles in conducting research. They write several short papers that require research using a variety of scientific resources and the Internet.*
- **Eleventh-grade** — *Students write proposals for projects, keep journals throughout the investigative process, write papers and make oral presentations on the proposed topics.*

Barnwell's efforts in science are paying off. The school showed an impressive gain in science achievement on the HSTW Assessment between 2000 and 2002. Mean scores increased from 293 to 303.

To get such results requires planning on the part of teachers and school leaders. Barnwell's science teachers work with teachers from other disciplines to incorporate experiences that promote deeper learning. For instance, science teachers insist that their students use English department guidelines in writing science reports. They also ask all teachers to emphasize mathematics in their classrooms to help build the mathematics skills that are essential in science. Science teachers observe the career classes at the Barnwell County Career Center to learn what scientific concepts students need. Career center faculty and the high school science department faculty meet to discuss common problems, successful practices and the revision of unsuccessful approaches. Barnwell's science teachers are committed to continuous improvement in science for all students. They meet each summer to review and revise the content standards for each class and revise the resource book that contains suggested learning activities for the standards.

Extra Help

Students get more extra help from teachers and other students to meet higher standards at high-implementation schools than at low-implementation schools.

Raising expectations and teaching higher level courses are not enough to improve student achievement and sustain it over time. Schools must provide extra help to assist students in meeting higher standards. Students learn more when they know their teachers believe in them and want to help them succeed. Such support motivates students to work harder and convinces them that school matters.

The two indicators below are used to determine the availability of extra help to students. Having one or both of these experiences suggests that extra help was available to the student. Having none of the experiences suggests that extra help was not effectively available.

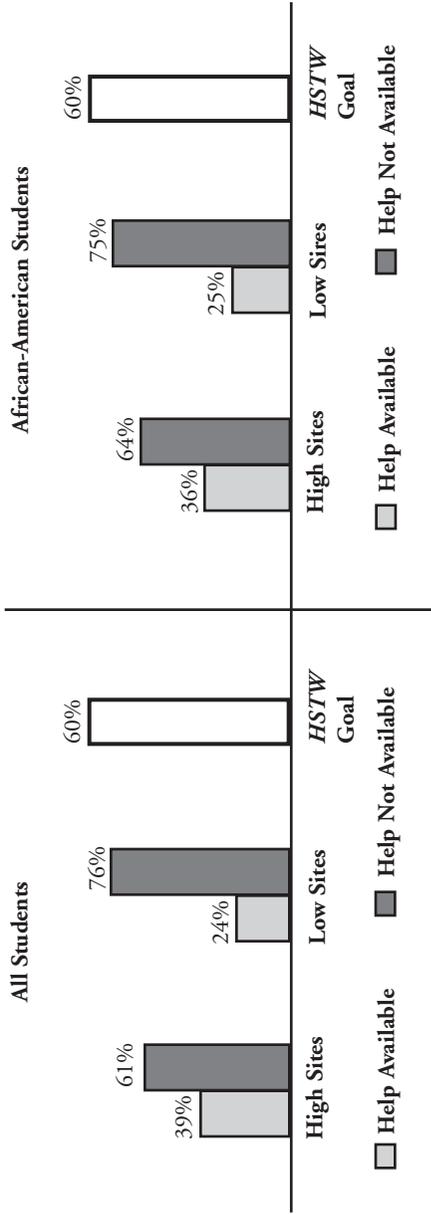
Two Indicators of School Emphasis on Extra Help

- Teachers are frequently available before, during or after school to help students with their studies.
- Students are able to get extra help from teachers when they need it without much difficulty.

High-implementation schools enrolled more students, including more African-American students, into more demanding courses and then provided them with the extra help they needed to meet the higher course standards. **For example, students at high-implementation schools were 15 percent more likely to report that extra help was available to them to meet higher course standards than were students at low-implementation schools.** (See Figure 13.) Thus more teachers in high-implementation schools took the responsibility to give students the extra help they needed.

Not only did students in high-implementation schools get more help from their teachers, but there was a climate in which more students were willing to help each other master difficult materials and assignments. For example, 40 percent of students at high-implementation schools said they got extra help each week from another student, compared to 32 percent at low-implementation schools. The differences between high and low-implementation schools were similar for African-American students. **It is essential that high school leaders and teachers create a school environment that encourages students to assist each other.**

Figure 13
Percentages of Students Reporting Availability of
Extra Help at High- and Low-implementation Schools



Help available: one or both indicators

Help not available: neither indicator

Source: 2002 *HSTW* Assessment results for career-oriented students
 Differences between percentages are significant at the .01 level.
 The *HSTW* goal for the emphasis on extra help is 60 percent.

Swain County High School, Bryson City, North Carolina

At least 75 percent of career-technical students at Swain County High School meet the HSTW performance goals and their success is partly attributed to the extra help given to the majority of its students. Janet Clapsaddle, the principal of this high-implementation school, said, "Ten years ago, we asked teachers from every department to volunteer to tutor students after school from the end of the student day to the end of the teacher workday to help students catch up and move forward in their studies. Students responded." The school's media center is open from 7 to 8 a.m. on Wednesdays and Fridays and from 3 to 8 p.m. the other three days of the week. Students flock to the center to use the computers, find printed resource materials or get help with their research projects. College students provide homework help from 6 to 8 p.m. three nights a week at the school or by telephone. During the 2002-2003 school year, at least 408 of the 484 students (84 percent of all students) used some aspect of the program.

Swain County students reported the following extra help experiences:

- *56 percent reported getting extra help **often without difficulty** from their teachers;*
- *79 percent reported that extra help was **often available**, before, during or after school;*
- *65 percent reported that extra help resulted in **getting better grades**; and*
- *49 percent reported that extra help assisted them in **understanding schoolwork better**.*

To reduce the number of unprepared students entering the ninth grade, Swain County expanded its ninth-grade transition program to include a summer class for students who may need help adjusting to high school.

Guidance and Advisement

More students and parents participate in a guidance and advisement system at high-implementation schools than at low-implementation schools.

Schools can improve student achievement by increasing the amount of time available for students to talk with counselors and teachers about making decisions to choose and complete a challenging programs of study. Advisers make a difference in students' lives by helping them and their parents plan programs of study that include a solid academic core and either an academic or a career concentration.

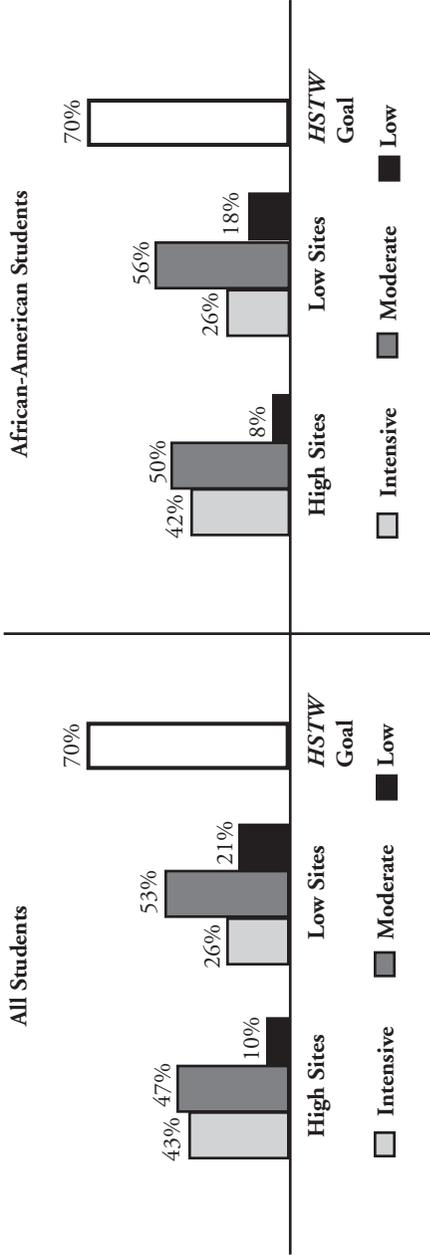
The 12 indicators listed help determine the emphasis on quality guidance. They describe the guidance experiences that all students should have. Students with 10 to 12 of these experiences were considered to have had an intensive emphasis on guidance; students with six to nine a moderate emphasis; and students with five or fewer a low emphasis on guidance.

At high-implementation schools, 43 percent of students had intensive guidance experiences, compared to 26 percent at low-implementation schools. (See Figure 14.) Eleven percent more students at low-implementation schools had low guidance experiences than at high-implementation schools. A similar pattern occurred for African-American students.

Twelve Indicators of Emphasis on Quality Guidance

- A teacher or counselor talked with students individually about their plans for post-high school careers or further learning.
- A teacher or guidance counselor helped students review their programs of study **annually**.
- A teacher or counselor visited classes to talk about planning for post-high school careers or further learning.
- Each student had an adult mentor for all four years of high school.
- Mentors helped them develop their course choices for high school and reviewed those courses **annually**.
- Students participated in a group tour of a local business.
- Students spoke with or visited persons in careers to which they aspired.
- Someone from a college talked to students about going to college.
- Students and their parents received information or assistance from someone at the school in selecting or applying to college.
- Students received information from someone at school about how to do well at job interviews.
- Students received information and counseling about continuing their education.
- Students received encouragement to take a combination of academic and career/technical courses.

Figure 14
Percentages of Students by the Guidance Experiences
at High- and Low-implementation Schools



Intensive: ten to 12 indicators

Moderate: six to nine indicators

Low: five or fewer indicators

Source: 2002 *HSTW* Assessment results for career-oriented students

The differences between the distributions of the two groups of schools are significant at the .01 level.

The *HSTW* goal for the emphasis on guidance is 70 percent.

Counselors and teachers at high-implementation schools, compared to those at low-implementation schools, focused more on preparing students for both further study and for work. At high-implementation schools:

- 11 percent more students talked with a school representative about developing plans for post-high school careers or further learning;
- 12 percent more students had annual meetings with their advisers to review their programs of study;
- 10 percent more students reported that teacher or counselors visited classes to talk about planning for post-high school careers or for further learning;
- nine percent more students had adult mentors who guided them during all four years of high school;
- nine percent more students talked with parents about their high school programs of study;
- 12 percent more talked with persons in career fields to which they aspired, and eight percent more talked with someone from a college about going to college;
- 11 percent more students received information and counseling about continuing their education;
- 10 percent more students talked with their teachers about their plans after high school;
- 10 percent more students and their parents received information or assistance from someone at the school in selecting or applying to college;
- nine percent more students received information from someone at school about how to do well in job interviews; and
- nine percent more students received encouragement to take a combination of academic and career/technical courses.

The differences in experiences between the two groups of schools were similar for African-American students.

Good guidance helps students make better choices about courses to take in high school and encourages them to be persistent in completing courses that are the most effective in preparing them for postsecondary study. At high-implementation schools, the guidance and advisement systems were more in line with the school's mission of teaching all students a solid academic core than were the guidance and advisement systems at low-implementation schools. At both groups of schools, too few students were encouraged to take the right mathematics and science courses and to take four years of mathematics. **If counselors, teachers and school leaders believe that career-oriented students should leave high school prepared for both further study and work, then they have a solvable problem. If they do not believe this, then they do not recognize the problem and will not likely solve it.**

Nansemond River High School, Suffolk, Virginia

School leaders and teachers at Nansemond River High School believe it is important to provide quality guidance and advisement for all students. Tom McLemore, the principal of this high-implementation school, knows that his school believes good guidance is a key to success. He said, "Our school motto is 'Every child is a star.'" To help each student recognize and realize his or her dream, the guidance staff works beyond the normal school day to inform every student about academic requirements, the state Standards of Learning, postsecondary and career options, scholarships and financial aid, and other matters that will help them become positive, productive citizens. McLemore added, "We offer advanced placement and dual-credit college courses, and high percentages of our juniors and seniors complete high-level mathematics and science courses."

Counselors at the school are assigned to students by grade level. They host guidance nights six times a year to meet with parents about their students' futures. Counselors go into the English classrooms three times a year to explain graduation requirements, state standards and other topics related to students' four-year programs of study. "Our counselors work with business leaders to ensure that students get the academic and technical skills they need to be successful in the workplace," the principal said.

The 2002 HSTW Assessment data confirm that students at Nansemond River are getting higher quality guidance. The percentages of students who said they had meetings in which they worked with their parents and a school representative to plan their high school programs of study rose sharply from 33 percent in 2000 to 75 percent in 2002. Advisement is probably a major factor in the increase in the percentages of students completing challenging courses. For example, the percentages of career/technical students at the high school who completed the recommended curriculum in:

- *college-preparatory English/language arts increased from 27 percent to 38 percent;*
- *mathematics from 71 percent to 87 percent and the percentage completing four years of mathematics from 38 to 65;*
- *science doubled from 17 percent to 38 percent*

It is not a surprise that the mean scores on the HSTW Assessment at this school increased to exceed the HSTW goals in all three areas — from 277 to 285 in reading, from 291 to 300 in mathematics, and from 283 to 299 in science.

Continuous Improvement

More teachers report a climate of continuous improvement at high-implementation schools than at low-implementation schools.

High-implementation schools had higher achievement because school leaders and more teachers in these schools were constantly working to improve school and classroom practices and student achievement. These schools used student assessment and program evaluation data to create a climate that encourages higher achievement. Six indicators are used to define the emphasis on continuous improvement. Teachers in schools with four to six of these experiences are in schools with an intensive emphasis

on continuous improvement; teachers in schools with two to three of these experiences a moderate emphasis; teachers in schools with zero to one a low emphasis.

Six Indicators of the Emphasis on Continuous Improvement

Teachers:

- **Strongly agree** that the goals and priorities of the school are clear.
- **Strongly agree** that teachers in the school maintain a demanding yet supportive environment that pushes students to do their best.
- **Strongly agree** that they and school administrators work as a team to improve student achievement.
- **Strongly agree** that they are continually learning and seeking new ideas on how to improve student achievement.
- **Strongly agree** that they use data reports to continuously evaluate the school's academic and technical programs and activities.
- Meet **at least monthly** with a group of teachers to examine student work to determine if it meets state or national standards in their content areas.

High-implementation schools had a stronger emphasis on practices that reflect a climate of continuous improvement than do low-implementation schools. At high-implementation schools, 61 percent of teachers believed that their schools had an intensive to moderate emphasis on continuous improvement compared to 49 percent in low-implementation schools. (See Figure 15.)

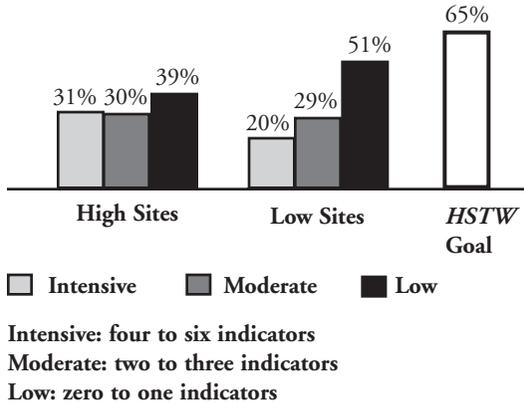
Teachers at high-implementation schools had a clearer vision of what they must do to improve their schools than did teachers at low-implementation schools. Twenty percent more teachers at high-implementation schools than at low-implementation schools reported that their goals and priorities were clear. It is simple. If more teachers agree on the school's end results, the school will make more progress. It is not surprising that 10 percent more teachers at high-implementation schools reported that their schools maintained a demanding and supportive climate to help students succeed.

More teachers at high-implementation schools understood that academic performance of students depends greatly upon what adults in the school do. Teachers in high-implementation schools displayed a belief that they have the capacity to influence how well students learn and that most students can be motivated to master essential skills and content. At high-implementation schools:

- 10 percent more teachers were engaged in using data to evaluate school and classroom practices;
- 10 percent more teachers reported that they were constantly searching for new ideas that would improve their effectiveness in student achievement; and
- eight percent more teachers reported that teachers and administrators were working together to improve what happens to the students in their schools.

Making significant improvement in high school requires school leaders to be curriculum leaders. They must encourage teachers to raise their standards and teach in ways that motivate students to meet those standards and make sure that students receive the support they need. It takes leaders who frequently encourage teachers to apply what they learn, to work together in examining student work and to revise their instruction to be effective in improving learning and achievement. It means principals must function as instructional leaders.

Figure 15
Distribution of Teachers by the Emphasis on Continuous Improvement Experiences at High- and Low-implementation Schools



Source: 2002 HSTW Teacher Survey results
Differences between the distributions of teachers at the two groups of schools are significant at the .01 level.
The HSTW goal for emphasis on continuous improvement is 65 percent.

Destrehan High School, Destrehan, Louisiana

The principal at Destrehan High School gets his whole faculty to work together on the goal of preparing all students to succeed in high school and beyond. A high-implementation school located west of New Orleans, Destrehan is a place where teachers' voices are heard and their opinions count. James Bertrand, chairman of the social studies department, said, "Our principal believes that school leaders are placed in the school to assist teachers in doing their jobs. He provides the best tools and gives teachers the autonomy to use the ones they need." A member of the principal's advisory committee, Bertrand said that his high school is organized so that teachers can fully participate in making decisions about curriculum and instruction. The principal assembles data and lets the committee of department chairs identify academic deficiencies and design plans to overcome them. During the school year, the committee meets with the principal and assistant principals weekly to focus on implementing the plan. All teachers meet by department every Monday afternoon.

Many teachers at Destrehan High School reported having the following continuous improvement experiences:

- *65 percent strongly agree that the goals and priorities of the school are clear;*
- *63 percent strongly agree that teachers in the school maintain a demanding, yet supportive environment that pushes students to do their best;*
- *55 percent strongly agree that they and the school principal work as a team to improve student achievement;*
- *78 percent strongly agree that they are continuing learning and seeking new ideas on how to improve student achievement;*
- *93 percent strongly agree that they use data reports to continuously evaluate the school's academic and technical programs and activities; and*
- *69 percent meet at least monthly with a group of teachers to examine student work to determine if it meets state or national standards in their content area.*

The school is organized into small learning communities of students and teachers. Teachers in each community write three-year action plans that they revise annually during a summer retreat away from the school. During the school year, teachers meet in study groups twice a month to examine students' work and assess their learning. The school's staff development coordinator provides continuing education to the study groups on topics that teachers have identified. The 2002 HSTW Secondary Teacher Survey confirmed this — All teachers reported that their principal organizes study teams to address the various components of the school improvement plan and 93 percent said their principal uses data at least annually to evaluate the school's academic and technical programs. It is not a surprise, then, that 81 percent said that the principal encourages them to experiment with their instructional strategies. The intent is to help teachers to improve their instruction until it is effective in improving student achievement.

What can school districts and states do to get all students to achieve at least at the basic level and at least half at the proficient level and above on a NAEP-like exam?

District and high school leaders can help get the high school graduation requirements right.

- Require high schools to have students complete the *HSTW*-recommended academic core or show an increase in the percentages of students annually completing such a core until at least 85 percent have done so.
- Have every student complete an academic concentration, a career/technical concentration or additional challenging academic courses.
- Align standards for all English/language arts courses to requirements that prepare students for postsecondary studies without having to take remedial or developmental English/reading.
- Support science teachers in having the necessary laboratories, equipment, supplies and training for all students to have laboratory-based learning experiences **at least weekly**.
- Organize a high school humanities concentration to include four or more credits each in college-preparatory/honors English and social studies, with at least one credit at the Advanced Placement level (AP) and four additional credits drawn from the broad fields of foreign language, fine arts, literature and social studies courses.
- Organize a high school mathematics and science concentration to include a minimum of four credits in college-preparatory mathematics and science with at least one credit at the AP level.

District and high school leaders can help develop faculty understanding of teaching to standards and good teaching practices.

- Prepare school leadership teams who understand the level of assignments, quality of student work and classroom assessments that reflect basic, proficient and advanced levels of learning and who can develop among faculty, students and parents a shared understanding of the level of student work required to meet high school graduation requirements, undertake postsecondary study and get good jobs.
- Support teachers in deepening their subject matter content knowledge.
- Support teachers in learning how to make greater use of research-based teaching strategies — using real-world problems, technology, cooperative learning, project-based learning, higher level questioning, etc.
- Train all teachers on literacy strategies they can use to improve student achievement in their subject areas.

District and high school leaders can help establish understanding among teachers, students and parents about the quality of work and level of effort required to become prepared for postsecondary studies and good jobs.

- Establish a school policy that students are to redo work until it meets standards.
- Communicate to students and parents that success in high school depends on doing at least one or more hours of study outside of class for every three hours spent in class.
- Provide a support class that helps ninth-graders who are at risk of failing to learn how to study, see the importance of high school to their future, acquire the social skills for getting along with adults, and work and learn with other students.

- Establish school goals that all students will
 - read at least 25 books or their equivalent during the school year and be held accountable for demonstrating that they understand what they read;
 - complete short writing assignments each week in all classes;
 - write research papers in all classes that allow students to become expert on topics and contribute to their classmates' learning.

District and high school leaders can help develop a system that supports parents and students in setting and achieving postsecondary goals.

- Provide each student with an adult advocate who knows the student and can “nag, nudge and nurture” the student toward successful completion of an upgraded academic core and a concentration and successful transition to a career and further learning.
- Require all eighth-graders and their parents or guardians to meet one-on-one with a school representative to plan challenging and purposeful programs of high school studies that prepare the students for further learning without remediation in postsecondary studies and for good jobs upon graduation from high school; and devise a system to ensure similar meetings occur each year to review the plans and students' progress.
- Establish an extra-help program in grades nine through 12 that involves a systematic approach to give students the assistance they need to meet challenging course standards.

District and high school leaders can help get students ready to succeed in rigorous high school courses.

- Educate middle grades principals, faculty, parents and students about what students need to know and be able to do to succeed in rigorous high school and postsecondary studies without remediation and in good jobs in career fields where students can advance.

- Work with middle grades leaders to identify and provide accelerated instruction in reading, language arts and mathematics to seventh- and eighth-graders who need such instruction to succeed in college-preparatory academic courses in grade nine.
- Provide extra help to students entering grade nine who are below state standards in reading, English and mathematics. Expect them to attend special four- to six-week summer programs and 18-week catch-up courses the first half of the ninth grade to get them ready for college-preparatory English and Algebra I during the second semester of the ninth grade.

District and high school leaders can help use the senior year to get students ready for postsecondary studies and good jobs or to jump start postsecondary studies.

- Strengthen the senior year so that students who are ready for college at the end of grade 11 can use the senior year to earn college-level credits in both academic and career/technical courses.
- Encourage high school, postsecondary and business leaders to work together to develop criteria under which high school students can earn postsecondary credits in high-quality and high-demand career fields.
- Identify students in grade 11 who plan to pursue postsecondary studies and by all indications are not prepared to do so. Arrange to give to these students college placement tests. Enroll the students failing the college placement tests in special courses the senior year — language arts, reading and mathematics — designed to get them ready for postsecondary studies without having to take remedial courses.

States can help support districts and high school leaders by getting state accountability policies right.

- Hold each high school accountable for increasing the percentages of students annually who complete the recommended academic core, complete either an academic or a career concentration, meet established performance goals, and enter high school and graduate four years later.
- Inform high schools annually about the percentages of their graduates who pursue postsecondary studies and take one or more remedial courses.
- Hold middle grades schools accountable for increasing annually the percentages of students leaving grade eight having successfully completed Algebra I.
- Provide alternative ways that students can demonstrate their performance in core academic subjects and establish assessment options for students to demonstrate achievement in career/technical studies.

States can support district and high school leaders with adequate resources.

- Support the use of extra help that many students need to meet more demanding course standards and to retain them through high school completion.
- Support professional development aimed at deepening teachers' subject matter knowledge and ability to use engaging research-based teaching practices.
- Support students' access to high-quality, high-demand career/technical studies at the high school and postsecondary levels or at work sites.
- Provide support for transition systems — middle grades to high school and high school to postsecondary — that reduce course failure rates in grade nine and reduce the percentages of students having to take remedial courses in postsecondary studies.

- Cover the costs of students taking AP, national employer certification and other related exams.
- Support state and regional leadership academies aimed at developing the capacity of district and school leadership teams, principals, aspiring principals and teacher leaders who can help build consensus among the faculty on what it means to teach to high standards, teach well, help low-performing students become independent learners and create a climate of continuous school improvement.

What can national policymakers do to support the efforts of states, districts and schools to get all students to achieve at least at the basic level and at least half at the proficient level and above on a NAEP-like exam?

- Ask states to show annual progress in increasing the percentages of career-oriented students completing the college-preparatory academic core.
- Support funding that expands high school students' access to high-quality, high-demand career/technical studies either in secondary schools, work sites or postsecondary institutions that result in getting more students to pass national employers' certification exams at the end of high school and pursue continued postsecondary studies toward a degree, an associate degree or certificate.
- Support collaboration among states to develop end-of-program exams to measure students' technical literacy skills, defined as the ability to:
 - read, interpret, comprehend and synthesize the language of the career field being studied;
 - use mathematics to solve the kinds of problems they will encounter in not only entry-level jobs, but also in advanced-level jobs;
 - demonstrate understanding of scientific concepts that underlie their fields of study; and
 - understand major technical concepts that form the foundation for continued learning in a broad career field.

- Ask states to establish for career/technical teachers sufficiently high academic, teaching field and methodology standards to enable them to advance students' technical literacy; allow states to use federal resources to upgrade the knowledge and skills of current teachers and support the development of new teachers.

Summary

Reversing the current decline in the number of students who earn meaningful high school diplomas in the majority of states will require a unified effort by national, state and local leaders to create a high school curriculum that provides rigor, relevance and support for students. It will require a shared vision of a high school in which school leaders, teachers, students and parents work together toward the common end of preparing all students for successful transition from high school to the next steps — work and further study. It will take a common national, state and local commitment if we are to truly work toward a high school in which we believe that all students are capable of performing at much higher levels. It means breaking out of old practices that continue to perpetuate the myth that many students cannot learn and are not willing to make the effort to do so. For many students, that new high school must find a way to blend rigorous academics with high-quality, high-demand career/technical studies that open up new vistas for students.

What 12th-grade Students Know and Can Do at the Three Reading Proficiency Levels

Basic (and *HSTW* Goal)

***Scores:** 262 – 287

Twelfth-graders performing at the Basic level:

- demonstrate a general understanding of grade-level texts;
- locate specific information and identify the main ideas and purpose;
- make simple connections between ideas within a text and provide general evaluations of its meaning or purpose; and
- identify interpretations and text-based support for these interpretations.

Proficient

***Scores:** 288 – 316

Twelfth-graders performing at the Proficient level:

- demonstrate understanding of grade-level texts;
- understand explicitly stated ideas, compare and contrast information in different parts of a text, determine the relative importance of different ideas and provide overall interpretations of a text's meaning;
- recognize connections between ideas in the text, with other texts and with real-life experiences; and
- recognize general organizational features and can extend ideas in the text through making inferences, such as predictions and conclusions.

Advanced

***Scores:** 317 – 500

Twelfth-graders performing at the Advanced level:

- demonstrate a thorough understanding of grade-level texts;
- integrate text ideas, explain causal relationships, and evaluate complex information and organizational features;
- analyze text ideas to provide specific and extensive support for evaluations and interpretations of the text;
- evaluate an author's opinion and explain how that opinion is conveyed;

- make connections between complex, deeply embedded ideas within the text, with other texts and with real-world experiences; and
- interpret and explain specialized terminology.

Performing at the *HSTW* Goal**Score:** 279

Twelfth-graders performing at the *HSTW* goal demonstrate general and specific understanding of grade-level texts. They use explicitly stated ideas to support interpretations, identify and evaluate relevant information and connect ideas from across a text to make simple inferences. They use examples and specific information to support straightforward interpretations and evaluations. They use knowledge of common structures and types of texts to describe and evaluate how information is presented.

* Twelfth-grade scores are on a scale of 0 to 500.

What 12th-grade Students Know and Can Do at the Three Mathematics Proficiency Levels

Basic (and *HSTW* Goal)

***Scores:** 297 – 327

Twelfth-graders performing at the Basic level:

- possess an understanding of simple mathematical concepts and are able to perform basic arithmetic operations;
- are beginning to utilize elementary reasoning techniques to solve straightforward problems and use their knowledge of procedures and elementary concepts to solve one- or two-step word problems;
- perform simple measurement tasks and work with metric units of measure, understand the properties of triangles and quadrilaterals, and identify lines of symmetry on geometric figures;
- can visualize geometric figures in two and three dimensions and reason spatially;
- read and interpret graphs, compute with data from tables and graphs, and answer simple conditional probability questions; and
- have a procedural understanding of algebra, complete such tasks as combining like terms, solving simple linear equations and inequalities, locating points on a coordinate grid, constructing algebraic representations and extending numerical patterns.

Proficient

***Scores:** 328 – 348

Twelfth-graders performing at the Proficient level in addition to Basic skills and knowledge:

- use analysis techniques and more sophisticated reasoning skills in solving problems, including those that require them to integrate more than one mathematical idea or strategy;
- use their knowledge of number theory, to work with prime numbers, and even and odd integers;
- approximate square roots and compute with fractions and percents in several contexts;

- work with scale drawings, successfully solve problems involving non-routine applications of area, employ more sophisticated spatial reasoning, identify correct statistical sampling methods, and determine missing data when given probability information; and
- understand linear functions in algebra, are beginning to understand non-linear functions, solve a system of two linear equations using simple elimination, relate integers to real-world situations, and work with distance and slope in a coordinate system.

Advanced***Scores:** 349 – 500

Twelfth-graders performing at the Advanced level in addition to Basic and Proficient skills and knowledge:

- understand and utilize notation, reasoning and mathematics processes;
- make important connections within mathematics and between mathematics and other areas;
- work with non-routine applications and make predictions;
- regularly evaluate their work and answers for reasonableness;
- recall and utilize appropriate formulas in a variety of problems such as circumference, the Pythagorean Theorem and trigonometric ratios;
- solve a system of two linear equations using methods beyond one-step elimination;
- work with multiple representations in algebra and understand fundamental algebraic concepts; and
- work with non-routine problems across various content areas, including solving problems about piece-wise functions, cross-sections of three-dimensional figures, mathematical sequences and precision/ tolerance.

* Twelfth-grade scores are on a scale of 0 to 500.

What 12th-grade Students Know and Can Do at the Three Science Proficiency Levels

Basic (and *HSTW* Goal)

***Scores:** 299 – 325

Twelfth-graders performing at the Basic level:

- have some elementary factual and conceptual knowledge of various areas in science that include reading and interpreting a graph or diagram, estimating distance on a map using a scale, recognizing the elements of the scientific method (such as appropriate experimental conditions) and understand that scientific theory is founded on experimental observations and predictions that are testable;
- demonstrate knowledge of fundamental biological terms and concepts;
- identify biological structures in a diagram, recognize basic functions of structures in living systems and recognize evidence of change over time;
- know basic terminology related to matter in physical science and recognize that symbols and formulas represent chemical substances;
- identify principles of physical science, such as the laws of motion, and recognize implications of concepts such as density and reflection; and
- recognize in earth science geological formations and provide a description of basic processes taking place within Earth's systems, such as the water cycle.

Proficient

***Scores:** 326 – 351

Twelfth-graders performing at the Proficient level in addition to Basic skills and knowledge:

- relate and apply science concepts and are more skilled in scientific experimentation;
- design a scientific investigation, know how to evaluate the appropriateness of an experimental design, and understand that the credibility of experimental results depends on their reproducibility; interpret a graph and explain the results; recognize the environmental impacts of humans on nature; and can use basic mathematical skills to solve a problem and interpret a topographical map;

- know the relationship between structure and function in organisms, recognize the varying degrees of their complexity and understand that a greater level of complexity causes an increase in specialization;
- know how the history of life on Earth is demonstrated, describe the fundamental principles of physical science and apply these concepts, such as thermal expansion, to simple practical situations; and
- recognize the difference between physical and chemical changes in matter.

Advanced***Scores: 352 – 500**

Twelfth-graders performing at the Advanced level in addition to Basic and Proficient skills and knowledge:

- understand more complex concepts and use their knowledge in complex practical situations and perform specific skills such as balancing a chemical equation and analyzing a graph to solve a conceptually advanced problem;
- know scientific terminology related to increasingly complex concepts, provide a complete explanation of processes that take place within Earth's systems, know the basic structure of the universe, and are able to identify the instruments used to make astronomical determinations;
- understand the particulate nature of matter, the relationships among those particles, and understand the fundamental principles of physical science as well as the ability to apply them;
- know the hierarchy of classification in life science, and understand the physiological processes within living systems; and
- apply prior knowledge to explain a novel situation.

High Schools That Work Goals

- Raise the mathematics, science, communication, problem-solving and technical achievement of more students to the national average and above.
- Blend the essential content of traditional college-preparatory studies — mathematics, science and language arts — with quality career/technical studies by creating conditions that support school leaders, teachers and counselors in carrying out key practices.
- Advance state and local policies and leadership initiatives necessary to sustain a continuous school-improvement effort for both academic and career/technical students.

Making Middle Grades Work Goals

- Increase the percentages of eighth-graders who perform at the Basic and Proficient levels in academic subjects.
- Provide educational experiences that increase students' knowledge and skills in reading, mathematics, language arts, science and social studies.
- Provide students with opportunities to apply their skills in the fine arts and to explore careers and new technology.

High Schools That Work

Key Practices

- **High expectations** — setting higher expectations and getting more students to meet them
- **Career/technical studies** — increasing access to intellectually challenging career/technical studies, with a major emphasis on using high-level mathematics, science, language arts and problem-solving skills in the modern workplace and in preparation for continued learning
- **Academic studies** — increasing access to academic studies that teach the essential concepts from the college-preparatory curriculum by encouraging students to use academic content and skills to address real-world projects and problems
- **Program of study** — having students complete a challenging program of study with an upgraded academic core and a major
- **Work-based learning** — giving students and their parents the choice of a system that integrates school-based and work-based learning. The system should span high school and postsecondary studies and should be planned by educators, employers and employees
- **Teachers working together** — having an organization, structure and schedule giving academic and career/technical teachers the time to plan and deliver integrated instruction aimed at teaching high-level academic and technical content
- **Students actively engaged** — getting every student involved in rigorous and challenging learning
- **Guidance** — involving all students and their parents in a guidance and advising system that ensures the completion of an accelerated program of study with an in-depth academic or career/technical major
- **Extra help** — providing a structured system of extra help to enable students who may lack adequate preparation to complete an accelerated program of study that includes high-level academic and technical content
- **Keeping score** — using student assessment and program evaluation data to improve continuously the school climate, organization, management, curriculums and instruction to advance student learning and to recognize students who meet both curriculum and performance goals

High Schools That Work

Key Conditions for Accelerating Student Achievement

High Schools That Work (HSTW) is based on the belief that everyone in the education hierarchy must work together to align policies, resources, initiatives and accountability efforts to support schools as they adopt comprehensive school-improvement designs. The following conditions are fundamental in using *HSTW* to raise student achievement:

- **An organizational structure and process for ensuring continuous involvement by school administrators and teachers in planning strategies to achieve the key practices** — Each school needs a clear mission statement to prepare high school students for success in postsecondary education and the workplace.
- **Leadership from the district and the school to improve curriculums, instruction and student achievement** — Each school site should have a leadership team consisting of the principal, the assistant principal and teacher leaders who support, encourage and actively participate with the faculty in implementing the key practices.
- **A commitment from the school board to support the school in replacing low-level academic courses** — Schools should offer a more demanding academic core and either an academic, a career/technical or a blended concentration.
- **A system superintendent and school board members who support school administrators and teachers in carrying out the key practices** — This commitment includes financial support for instructional materials, time for teachers to meet and plan together, and six to eight days per year of staff development on using the key practices to improve student learning.
- **A school superintendent and a school board that will allow the high school to adopt a flexible schedule that enables students to earn more credits** — The block schedule that *HSTW* recommends for challenged schools makes it possible for students to earn 32 credits in four years.

Making Middle Grades Work Improvement Framework

- **An academic core** — All students in the middle grades need an academic core curriculum that accelerates their learning so they succeed in college-preparatory English, mathematics and science.
- **All students matter** — Each middle grades student needs an adult who takes interest in his or her successful learning, goal-setting, educational planning and personal growth.
- **High expectations and extra time and help** — Middle grades students need enough time and help to meet more rigorous, consistent standards in a curriculum that accelerates achievement for all students.
- **Classroom practices that engage students** — Young adolescents need varied learning activities linked to challenging academic content and opportunities to use new skills and concepts in real-world applications.
- **Use of data** — States, districts and schools continuously must use data on student, school and teacher performance to review and revise middle grades school and classroom practices as needed.
- **Teachers working together** — All middle grades teachers need time to plan together, to develop and coordinate learning activities, and to share student work that meets proficiency standards.
- **Support from parents** — Parents must understand clearly and must support the higher-standards for performance in the middle grades.
- **Qualified teachers** — Middle grades teachers must know academic content and how to teach young adolescents.
- **Use of technology for learning** — Middle grades students and teachers must have opportunities to explore and use technology to improve knowledge and skills in English/language arts, reading, mathematics, science and social studies.
- **Strong leadership** — Middle grades schools need strong, effective principals who encourage teachers and participate with them in planning and implementing research-based improvements.

Making Middle Grades Work Key Conditions for Accelerating Student Achievement

There is no “quick fix” for getting students to learn and to apply what they learn. Teachers, school and district leaders, and community members must work together to design improvement strategies, allocate resources and develop an accountability process. Implementing the comprehensive improvement framework requires a sustained effort and support from the entire educational system. Certain conditions provide a structure for changes in climate, practices and personnel. These conditions help schools focus on the elements in the framework that must be strengthened.

- **Commitment** — State partners, the local school board, district leaders and the community must commit to implementing the comprehensive improvement framework fully.
- **Planning for continuous improvement** — District and school leaders must create an organizational structure and a process that provide teachers and administrators with the time and means to discuss and plan strategies to raise student achievement. Leaders and teachers decide what to teach, how to teach, what to expect students to learn and how to evaluate student learning.
- **Curriculum** — District leaders must encourage a review to assess the curriculum’s alignment with state, national and international standards. Content and performance standards will define the quantity and quality of work expected at each grade level.
- **Support for professional development** — District and school leaders must provide leadership and financial support for professional development that is connected directly to academic standards and gaps in student achievement. Professional development includes support for teachers as they implement teaching practices that have proven records of effectiveness.
- **Teacher preparation** — The local school board should encourage teachers without majors or minors in the subjects they teach to upgrade their content knowledge through academic courses. The board also should make an effort to hire teachers whose content backgrounds match their teaching assignments.

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